Network for Studies on Pensions, Aging and Retirement

Netspar THESES

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Information and Healthcare in Developed and Developing Countries

PhD Thesis 2009

Information and Healthcare in Developed and Developing Countries

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Thesis submitted to University College London
for the degree of Doctor of Philosophy

September 2009

I, Ciro Avitabile, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Ciro Avitabile

- Chapter 1 draws on joint work with Vincenzo Di Maro
- Chapter 3 draws on joint work with Tullio Jappelli and Mario Padula

Abstract

This thesis studies the effect of information and cultural barriers on the demand for healthcare in both developed and developing countries. Chapter 1 exploits the randomized research design of PROGRESA, a conditional cash transfer programme implemented in rural Mexico, to study whether health interventions can have indirect effects on the propensity to screen for gender specific diseases. We show that among women not entitled to a cash transfer there is a higher likelihood of being screened for cervical cancer as result of greater social acceptance of the test and increased awareness of potential risk factors.

Chapter 2 discusses whether attendance at health and nutrition sessions as one of the requirements for receiving a transfer, affects the health behaviour of eligible adults. Using data from the randomized design of the PAL nutritional programme, implemented in rural Mexico, we show that there is a lower propensity among women for a large waist circumference, which is driven by reduced calorie intake based on better nutrition knowledge.

Chapter 3 examines whether the quality of primary care affects the uptake of mammography and colonoscopy among individuals aged 50 plus, in eight European countries. We find that better quality general practitioner care significantly increases the propensity to undergo screening.

Finally, Chapter 4 looks at whether the costs involved in acquiring health information are an important determinant of the decision to buy supplementary private health insurance and whether this explains in part the large cross country variation in supplementary private health insurance coverage across European countries. We find evidence that both education and proxies for cognitive ability act as substitutes for quality of health promotion in the propensity to sign a supplementary private insurance.

Acknowledgements

Writing a dissertation is a rewarding but also a difficult and sometimes frustrating experience. Completing my PhD dissertation would not have been possible without the help of many people.

I want to express my gratitude to my supervisor, James Banks, for his patience and his support while I was finding my way. His trust gave me the strength and confidence to pursue the research which forms part of the basis of this dissertation.

I am very grateful to Orazio Attanasio whose help was essential in the last and very critical stages of my PhD. I greatly benefited from both his insights and his moral support.

Discussions with Imran Rasul also contributed significantly to the content of my dissertation and my thanks go to him.

Special thanks go to Tullio Japelli. His encouragement was crucial in some very difficult times during my doctoral studies. His example has made me a better economist and a better man.

I want to thank Andreas, Daniele, Nithin and Vincenzo for being extraordinary colleagues whose help has been invaluable. I want to show much appreciation of the patience and understanding displayed by Annette during my studies. And I thank Rolando for cheering me up when my confidence was low.

My parents initially found it difficult to accept my decision to continue my studies at postgraduate level. This increases my indebtedness to them for their continuous support and belief in me. The completion of my PhD would not have been possible without them.

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Introduction

Arrow (1963) identifies two characteristics of health information that affect the functioning of healthcare markets. First, because the production and transmission of health information is costly, differences in the valuation of health information among consumers determine an unequal distribution of information or knowledge about health and medical care. Second, since consumers have difficulties in valuing information, "if [the consumer] knew enough to value the information, he would know the information itself (pg. 946)", this makes the marketability of consumer health information problematic. The first statement relating to the existence of unequally informed consumers, is the focus of many studies that investigate how information and knowledge affect demand for inputs in the health production function (see, among others, Kenkel (1990) and Kenkel (1991)). Using either direct measures of health knowledge, or education as a proxy for health information, these studies find that the take up of health care is higher for more informed than for less informed individuals. Arrow's second point has received much less attention. Difficulties in creating an efficient market for health information call for government action to improve individuals' awareness about health risks.

The role of health promotion becomes more crucial with the dramatic increase in chronic disease. For many years, cancer has been the second highest cause of mortality in developed countries after cardiovascular disease, and cancer screening programmes are in place in many European countries and in the US. Although the war against cancer is far from an end, some encouraging results have been obtained. Early detection has virtually eliminated cervical cancer mortality in both Europe and the US. And women affected by breast cancer are living longer due to the disease being detected at an earlier stage. However, the same is not true in developing countries. Although rates of breast cancer incidence globally have increased by approximately 0.5% on average since 1990, rates have increased by more than 5% per year in low resources regions. The potential high costs of screening programmes compared to their hard-to-evaluate benefits is the main

reason for the absence of screening programs in many developing countries, but where programmes are available, take up is extremely low.

This thesis is a collection of essays that addresses three main questions. First, do non-market mechanisms, such as social norms and lack of information, affect take up of health programmes? Second, how effective are health promotion policies in changing individuals' behaviour? Third, can health promotion policies contribute to reducing pressure on public health expenditure in the long run? While the first question might be more pertinent to developing countries, the last two are important for both developing and developed countries.

In the first chapter, entitled 'Spillover Effects in Healthcare Programmes: Evidence on Social Norms and Information Sharing', we study whether health programmes can have indirect effects on individuals not part of the target group. Assessing the existence of externalities is essential to performing a correct evaluation of the benefits and costs of health programmes. We exploit the randomized research design of PROGRESA, a large social welfare programme implemented in rural Mexico, to test whether, and through which channels, a conditional cash transfer programme can affect the propensity of women not eligible for the transfer, to be screened for cervical cancer.

One of the PROGRESA's components provides a financial reward to households whose members, both adults and children, undertake regular health checks and attend health-related talks. In particular, eligible adults have to undergo full preventive screening: both male and female household members have their blood pressure and blood sugar tested, but the PAP smear test is female specific. We study whether and how PROGRESA affects demand for cervical cancer screening from women in non-eligible households. After testing for the presence of an indirect effect in demand for cervical cancer screening, we focus on two mechanisms that might explain it: social norms and information sharing. There is a great deal of qualitative evidence suggesting that male opposition to women being screened by male doctors, might be a major reason for the low rate of uptake of cervical cancer screening. We exploit variations in the demographic composition of households to test to what extent PROGRESA might have weakened the social norm that prevents women from attending for testing. Second, since cervical cancer has well defined risk factors that are related to sexual behaviour, we exploit variations in contraceptive use to study to what extent the indirect effects are driven by lack of information.

Drawing on the experience of PROGRESA, conditional cash transfer (CCT) programmes have become increasingly popular as a policy tool to alleviate poverty

in developing countries. In order to receive the transfer, household members have to engage in a set of activities, including prenatal care, well-baby care and immunization, nutrition monitoring and supplementation, preventive checkups and participation in educational sessions on health and nutrition related topics. Thorough evaluation exercises show that CCT programmes have been extremely effective in improving child health, school attendance and household consumption. However, it is not clear how each of the components of the programme have contributed to this combined effect. In the second chapter, entitled 'Does Healthcare Promotion Matter in Poor Countries? Evidence from a Randomized Experiment', we exploit the randomized design of the evaluation sample of *Programa de Apoyo Alimentario* (PAL), a nutritional programme implemented in rural Mexico, to test how the educational component of the programme affects the health behaviour of adults, as measured as by their propensity to smoke, drink heavily and be obese. The original design of this evaluation sample is unique in including four different treatment types: a group of localities that acts as a control group, a group of localities that receive a transfer in kind without the requirement to attend health and nutrition sessions, a group that receive the transfer in kind but with the requirement to attend health and nutrition sessions, and a group that receives a cash transfer subject compliance with the educational requirement. Using information on the type of sessions attended, we identify the causal effect of the information received through PAL on individuals' health behaviour.

Unlike the case in developing countries, in many developed countries programmes for screening for different types of cancer are in place. In most European countries breast cancer screening is either free or heavily subsidized for women aged 50 plus. However, take up varies dramatically across countries. Data from the first Survey of Health, Ageing and Retirement in Europe (SHARE) show that the percentage of women screening for breast cancer is above 70 per cent in France, while it is only 22 per cent in Denmark. In the third chapter of this thesis, entitled 'GP Quality and Propensity for Screening Tests', we study how the quality of primary care affects the propensity to screen for breast and colon cancer among individuals aged 50 plus in 8 European countries. Exploiting information on the completion of standard geriatric assessments, we construct a measure of General Practitioners (GPs) quality and, after controlling for its potential endogeneity, we study how it relates to the decision to screen. In order to test whether GPs quality act either as complement to or substitute for the individual ability to acquire and process information, we test how the effect of GPs varies with number of years of education, and proxies for cognitive ability.

While in the short run health promotion programmes may increase public health expenditure, in the long run they might reduce the pressure on governments. In fact, better informed individuals might be more aware of health risks and be more likely to buy private health insurance. Private health insurance coverage in European countries is on average low and it varies dramatically across countries. In the final chapter of the thesis, entitled 'The Health Insurance in Europe: The Role of Health Information', we study whether the cost to acquire health related information partially explains variations in coverage of private insurance for hospital treatment, across eight European countries. Using individual microdata from the first two waves of SHARE, we test first whether, conditional on the insurance company's own assessment of an individual's risk type, individuals have private information on insurance determinants other than their risk type. Second, we test whether the individual ability to access health related information, as proxied by education and cognitive ability, affects the probability of buying insurance, with intensity varying with the quality of healthcare promotion.

There is a very lively debate (see Banerjee and Duflo (2008) and Deaton (2009)) on whether there has been an excessive use of randomized control trials to assess the effectiveness of development policies.

While medical and economic literature have long emphasized how lack of information and cultural barriers can affect the demand for health services, evidence based on observational studies does not allow to separately identify the two mechanisms. In this work we exploit both theoretical predictions and the exogenous variation of randomized controls trials to assess the importance of information and social norms as factors that can affect individual health related behaviour in developing countries. Consistent with the recommendations in Deaton (2009), we use data from randomized control trials as a tool to test *why*, and not just *whether*, welfare programmes can affect the demand for healthcare. However, there are relevant empirical puzzles that need to be addressed even in the absence of randomized experiments. That is the case for the large variation in private health insurance coverage across European countries. Exploiting both cross and within country variations in healthcare quality, we provide suggestive evidence that information can be an important determinant of the demand for healthcare in developing as well as developed countries.

CHAPTER 1

Spillover Effects in Healthcare Programmes: Evidence on Social Norms and Information Sharing

Screening programmes are a key healthcare priority. These programmes may have unintended effects on groups other than those the programme targets. While potential spillovers are not well understood or evaluated, their systematic assessment might change the evaluation or design of screening programmes and shed light on the determinants of screening behaviour. This paper exploits the randomized research design of a large welfare programme - PROGRESA - to study the size and determinants of spillover effects in cervical cancer screening in rural Mexico. Cervical cancer is considered to be one of the most preventable types of cancer, but cervical cancer mortality rates in Mexico have been dramatically high by international standards for many years. We find significant evidence of spillover effects in demand for Papanicolaou cervical cancer screening, yet there is no evidence of similar spillovers in non-gender specific tests, such as blood pressure and blood sugar. When we study the mechanisms that drive spillover effects we are able to distinguish between the roles of social norms and information sharing. For women living in male headed households there is increased demand for screening as PROGRESA undermines the social norm associated with husbands' opposition. Among women in female headed households screening is more frequent as a result of information sharing between those eligible and those not eligible for the programme.

§1.1. Introduction

Cervical cancer is the second most common cancer in women, and was responsible for 250,000 deaths in 2005, approximately 80% of them in developing countries.[1] Mexico for many years has had the highest cervical cancer mortality rates in the world (Lazcano-Ponce (1997)) and cervical cancer is still the prime type of cancer

[1] See *Comprehensive cervical cancer control: a guide to essential practice*, World Health Organization.

mortality for women aged 25 and above.[2] Unlike the case with other types of cancer, early detection can virtually eliminate the mortality risk associated with cervical cancer. In this paper we exploit the randomized research design of PROGRESA, a large conditional cash transfer programme, to study the determinants of the decision to screen for cervical cancer in rural Mexico.

While in many developed countries there is ongoing debate on the benefits and costs of breast cancer screening programmes, programmes aimed at detecting cervical cancer have been unanimously hailed as successful. Cervical cancer has recognized and well-described risk factors; there is an identifiable precancerous condition;[3] and a safe and cheap test (the Papanicolaou (PAP) smear test) for detecting precancer and cancer exists. As result, systematic use of PAP test has led to a huge drop in cervical cancer mortality in developed countries. However, this has not happened in developing countries.[4] Mexico is one of the most striking examples here. Despite a national screening programme being in place since 1974, the percentage of Mexican women who regularly screen for cervical cancer is well below the average of other OECD countries. Lack of compliance with cervical cancer screening advice is dramatically higher in rural areas where the percentage of women who have never been screened is more than double that in the Mexico City district (Lazcano-Ponce (1997)). While absence of screening is strongly correlated with low socioeconomic status, the mechanisms behind this correlation are largely unexplored.

The main question we address in this paper is why, despite availability of a free service and such a high expected payoff, women in rural Mexico do not screen for cervical cancer. In order to answer this question we exploit the randomized research design of PROGRESA, which is a large social welfare programme in rural Mexico. The sample consists of 506 villages: 320 were randomly assigned to be a treatment group within the PROGRESA programme, starting in May 1998, and 186 acted as controls, with the programme starting after November 1999. Data are available for all households in every village, both poor and non-poor, although only poor households are eligible for PROGRESA. The programme has two main components in the form of incentives. The first provides cash transfers to households conditional on their children's school attendance. The second provides a financial reward to households whose members, both adults and children,

[2] See Hidalgo-Martinez (2006).

[3] The transition to cancer occurs over a period of 10 years on average (see Blumenthal and Gaffykin (2005)).

[4] The World Health Organization estimates that 95% of women in developing countries have never been screened for cervical cancer.

undertake regular health checks and attend health-related courses. In particular, eligible adults have to undergo full preventive screening: both male and female household members have their blood pressure and blood sugar tested, but the PAP smear test is female specific.

In this paper we study whether and how PROGRESA affects the demand for cervical cancer screening from women living in non-eligible households. Exploring the indirect effects of PROGRESA,[5] the so called Indirect Treatment Effect (ITE), is important for a number of reasons. First, there is limited evidence on the existence and magnitude of health externalities. Christakis (2004) stresses that from a social perspective the cost effectiveness of a medical intervention might change substantially if the evaluation of benefits and costs takes account of externalities.[6] So far there is no large scale evidence on spillover effects across individuals in active health-seeking behaviour.[7] Second, identifying how PROGRESA affects the decision of non-eligibles to screen can shed light on the determinants of the demand for screening. As Luke and Munshi (2007) suggests, most of the existing literature fails to identify how cultural factors and social norms affect the demand for health services. Social norms might be particularly important to explain the health related decisions of the female population.[8] Others have studied the indirect effects of PROGRESA, focusing mainly on the role of income spillovers from eligible to non-eligible households and changes in informal credit markets.[9] This paper contributes to this literature by providing evidence that PROGRESA affects the behaviour of non-eligibles through non-market mechanisms, such as social norms and information sharing.

We begin by studying the effect of the programme on the demand for cervical cancer screening by non-eligible households compared to the demand for non-gender specific screening tests. In order to disentangle the effect of PROGRESA on the demand for screening from the supply, we exploit variations in health cen-

[5]Programmes with similar characteristics have either been or are in the process of being adopted in Brazil, Colombia, Ecuador, Honduras, Jamaica, New York city and Nicaragua.

[6]A related strand of literature (see Dow et al. (1999)) argues that, as implied by the competing risk model, complementarities between diseases might alter the evaluation of cause-specific health programmes.

[7]Miguel and Kremer (2004) using evidence from a randomized experiment show that a deworming programme significantly reduced infection rates among children not treated by the programme.

[8]Boulis (2000) argues that social norms might be an important factor to explain the low rate of breast and cervical cancer screening among ethnic and religious minorities in the US.

[9]Angelucci and De Giorgi (2006) find a significant effect of the programme on consumption of non-eligible households operating through insurance and credit mechanisms. Bobonis and Finan (2006) and Cattaneo and Lalive (2006) find that the programme significantly increases school enrollment among non-eligible families through a peer effect.

tre waiting times across villages. Our results show that the indirect treatment effect of PROGRESA on the demand for cervical cancer screening is positive, non trivial and significantly different from zero. We do not find any significant indirect effect on the probability of screening for diabetes and high blood pressure, or attending a health centre. We provide evidence that rules out the possibility that the indirect effect of PROGRESA on cervical cancer screening is due to income spillovers from eligible to non-eligible households.

We also study to what extent gender related social norms and information sharing can explain the indirect effect of the programme. While the literature that studies peer effects suggests that both mechanisms might be important (see Sacerdote (2000)), there is no empirical evidence that distinguishes one from the other. This is mainly because first, it is necessary to define the exact nature of the social norm, and second, social norms and lack of information might be strongly correlated. There is considerable qualitative evidence collected during the evaluation of PROGRESA (see Adato et al. (2000)) and in the course of epidemiological studies (see Watkins et al. (2002) and Lazcano-Ponce (1997)), to show that male opposition to wives being checked by male doctors is one of the most common reasons women give for not taking the test. In order to disentangle the social norm effect from the lack of information we examine the substantial heterogeneity of male and female headed households in terms of female status and cervical cancer risk factors. We show that while the degree of emancipation of female respondents in male headed households is lower than in female headed households, female respondents in the latter display lower levels of education and have higher risks of contracting cervical cancer. We sketch a simple model of social norm diffusion that shows how PROGRESA might affect the social norm. We test the theoretical predictions of the model exploiting across-village variations in the fraction of households eligible for the programme, and within-village variations in household composition.

Finally, we study whether PROGRESA generates information spillovers from eligible to non-eligible households. Exploiting different definitions of peer groups, we test a prediction of learning models that is not supported by alternative explanations. Models that study the adoption of new agricultural technologies (see Bandiera and Rasul (2006) and Conley and Udry (2005)) predict that the learning externality should be bigger for farmers with lower initial information. We use information on whether the respondent has ever used any method of contraception to proxy for the initial level of information about sex related diseases.

We find significant evidence of both social norm and information sharing mech-

anisms. Our results show that while the social norm mechanism mainly drives the indirect effect of the programme on women living in male headed households, information sharing explains the effect on female headed households.

Even though the specific focus of this paper is on rural Mexico and the impact of a conditional cash transfer programme, our findings have much wider applicability for developing and developed countries. There is persistent controversy on the design of national screening programmes and on target groups. Traditional approaches to evaluating the costs-benefits of screening programmes, such as the *health cost effectiveness* principle, fail to take account of the externalities from eligible to non-eligible individuals. Our results suggest that spillovers might significantly increase the benefits related to a screening programme. Although many European countries have breast cancer screening programmes in place for women age 50-70, the percentage of the female population that regularly screens for breast cancer varies dramatically across countries (see Avitabile et al. (2008)). Our findings show that the design of screening programmes should explicitly address cultural beliefs if the programme is to be effective. In the specific case of rural Mexico an increase in the number of female health professionals would improve screening rates and similar interventions should be considered in areas with large presence of ethnic and religious minorities. Recent literature (see Munshi and Myaux (2006)) has stressed the role of traditional institutions in shaping the effect of external interventions to increase growth. Our results can be seen as evidence that large scale interventions can have indirect effects on social norms that have negative consequences for social well being.

The paper is organized as follows. In Section 1.2 we provide background information on cervical cancer and its prevalence in Mexico, and on other chronic diseases. Section 1.3 describes the PROGRESA programme and the evaluation data. Section 1.4 presents the empirical method and the baseline estimation results. Section 1.5 provides evidence on the specific mechanisms through which the indirect effect of PROGRESA occurs. Section 1.6 concludes. Additional robustness checks are provided in appendix A.

§1.2. Background

1.2.1 — Cervical Cancer in Mexico

The Human Papillomavirus (HPV) has been identified as the major cause of cervical cancer and is found in 99.7% of cases. Out of the 100 different HPV types that have been characterized so far, there is a group of 30 that are transmit-

ted through sexual contact. HPVs are believed to be the most common of all sexually transmitted infections and most sexually active people get at least one HPV infection in their lifetime, usually without knowing it. Persistent infection with a subset of about a dozen so called 'high risk' sexually transmitted HPVs, including types 16, 18, 30 and 33 can lead to the development of cervical cell change (*dyskaryosis*), which in turn may lead to cancer of the cervix. The main risk factors are related to sex behaviour: early age of first intercourse, multiple sexual partners, early age of first pregnancy, multiparity,[10] and previous sexually transmitted infections. Additional risk factors include smoking and malnutrition. Since precancerous cells can be identified with the standard screening procedure, never being screened increases the risk of contracting cancer. The most common screening procedure is the PAP smear test. Although it is gradually being replaced by Liquid Based Cytology (LBC), the PAP smear test has proved very successful in reducing cervical cancer mortality. Between 1950 and 1998 in the US there was a 79% reduction in the incidence of cervical cancer and a 75% decrease in mortality; there is a unanimous consensus among specialists that most of these improvements are due to the systematic use of the PAP test (see among others Montz (2001)). When detected at an early stage, safe, effective and relatively inexpensive outpatient treatments are available (see Blumenthal and Gaffykin (2005)).

Following the example of developed countries, in 1974 the Mexican government started the Cervical Cytology Screening programme (CCSP). The programme's measures[11] allow for: i) all women to be screened free of charge regardless of their age; ii) health professionals to invite women in the age group 25-64 for screening, with particular attention to those with high risk factors; iii) written or verbal invitations to screen for all rural households with at least one woman aged 25 or over. Women who present two normal cytologies for two consecutive years are invited to screen every three years.[12] Despite this programme being in place, the adjusted mortality rate gap between Mexico and other developed and developing countries has been increasing over time (see Figure 1.1). According to the statistics provided by the National Health programme in 2000 the average cervical cancer mortality for women aged 25 or above was 20 over l00,000. Four

[10] Controversy exists over the causal explanation for this correlation. While some studies suggest that the physiological process in the last two trimesters of pregnancy modifies the host-immune response, others focus on the trauma of the cervix during delivery.

[11] The programme has been constantly modified and improved and the last change was passed by law on 31/05/2007.

[12] This is the recommended screening frequency in the UK and US for women in the age group 25-49.

states covered by the PROGRESA programme (Veracruz, Michoacán, Guerrero and San Luís Potosi) display an average mortality above the national average. While this high mortality might be due in part to the poor quality of health provision,[13] the main cause is the low take up of screening. OECD data for 2002 show that only 38.9% of Mexico's female population in the age group 20-69, were screened for cervical cancer in the previous three years, compared to 84.8% in the US (see Table 1.1). The National Health Survey (*ENSA*) 2000, which was designed to identify the health status of the entire Mexican population, reports that in 2000 only 27.4% of the female population aged 20 or over was screened for cervical cancer in the previous 12 months. 67.3% of the women who were screened received the results of the screening, and 9.3% were diagnosed as either a carcinoma or a dysplasia.

1.2.2 — Previous studies

As cervical cancer has for many years been considered a major health issue, there is an extensive epidemiological literature on the determinants of cervical cancer mortality in Mexico. Lazcano-Ponce (1997) carried out a cross-sectional study in two geographic regions of Mexico, Oaxaca (rural area) and Mexico City (urban area) to study the determinants of participation in the CCSP. This study found that non-compliance is strongly associated with low socioeconomic status and high reproductive risk. In Mexico City 35.8% of women (compared to 70% in Oaxaca) reported that they had never had a PAP smear test. A high proportion of women (20.3% in Mexico City vs 59.5 % in Oaxaca) were not correctly informed about what the test detects. In rural areas, many women reported they did not seek testing because their partners would not allow it. Watkins et al. (2002) conducted a pilot study using direct interviews to learn about factors that may influence cervical cancer screening among rural Mexican women. In a sample of 97 rural women between the ages of 16 and 66 the most frequent reason for not seeking a PAP smear was anxiety regarding physical privacy (50%). Less frequent reasons were lack of knowledge (18%) and difficulty accessing healthcare (14%). Other studies stress that while most women know what the PAP test is for, they do not perceive themselves to be at risk (see Lazcano-Ponce (2001)).

Cultural barriers to cervical cancer screening were also documented in the PROGRESA evaluation. Adato et al. (2000), in their study of the operational performance of PROGRESA, report that when asked about the main difficulties

[13] Flisser et al. (2002) finds that inadequate supply of reagents and inadequate laboratory facilities increases the failure rate of the PAP test.

related to the programme's health component, doctors often mentioned problems encountered by male colleagues over family planning advice and the preventive PAP smear test. Most doctors agreed that the PAP smear was the most difficult for women because many men were opposed to their wives having the test, and especially if it were done by a male doctor. However, discussions with beneficiaries and non-beneficiaries[14] suggest that PROGRESA fostered better acceptance of the PAP test.

1.2.3 — Prevalence of and screening for other chronic diseases

This section provides information on the prevalence of and screening rates for diabetes mellitus and high blood pressure using ENSA data. Among men (women) 8.5% (12.1%) of those aged 20 or above have been screened for diabetes and had a prevalence of 7.2% (7.8%). Among the states covered by PROGRESA, Guerrero, Hidalgo and Veracruz have an average prevalence higher than the national average. Prevalence among the non educated is 15.1% versus 4.8% for graduates. 10.9% (15.7%) of men (women) aged 20 or over had their blood pressure checked in 2000. The prevalence of hypertension is 30.7% for the total sample, with 32.6% for men and 29.0% for women. Prevalence of hypertension was highest among women aged 60-69 (48.1%). 22.9% of women graduates are affected by hypertension as opposed to 44% among non educated women.

Men and women in the age range 30-45, with no significant risk factors, are invited for diabetes screening every three years. Men and women aged 45 and over are recommended to have an annual diabetes test, and men and women aged 30 and over are advised to have their blood pressure checked annually. Women receive free screening under the Woman's Health programme (*Programma de Salud de la Mujer*); to our knowledge, there are no special arrangements for men.

§1.3. The PROGRESA programme

1.3.1 — The food and health component

The PROGRESA programme[15] was launched by the Mexican government in 1997 to alleviate poverty by fostering human capital accumulation. The programme offers two benefits: it provides cash transfers to households conditional on their children's attendance of primary and secondary school. It also provides transfer

[14] See p. 135 in Adato et al. (2000).
[15] Under the Fox administration the programme was renamed *Oportunidades*.

and nutritional supplements conditional on attendance in health programmes offered at local facilities.[16] The basic requirement for eligible households to receive the health and nutrition component is regular visits to local health centres. Children less than 24 months old and pregnant women are required to have screening on a continuous basis throughout the year, lactating women and children age 2-4 years old are required to have two health checks per year, and all individuals aged 17 or over are required to have an annual check up. The health centre visits include family planning advice, prenatal, childbirth and puerperal care, vaccinations, prevention and control of high blood pressure and diabetes mellitus, preventive treatment and screening for cervical cancer. In addition, beneficiaries are asked to attend health and nutrition talks (known as *platicas*).[17] In principle the cash transfer is conditional on all members of the household having met these criteria before payment is received. For the period July to December 1999 the value of the cash grant for food consumption was 125 pesos[18] per month (on average this corresponds to a quarter of the household's monthly income).

While mainly aimed at increasing the demand for health services, the food and health component also includes four actions to improve the supply of healthcare: (i) ensuring adequate supply of equipment to health centres; (ii) encouraging staff working in remote rural areas to continue there on a long-term basis; (iii) ensuring that health-care units have the necessary medicines and material (including educational health materials to distribute to families); (iv) providing training to improve the quality of medical care and the operational dimensions of the health service.

1.3.2 — Data and eligibility criteria

The experimental data contain information on households from a sub-sample of 506 poor rural villages in seven states: 320 villages were randomly assigned to the treatment group and started receiving the benefits of the programme from May 1998, while 186 villages were randomized out and did not receive treatment

[16] The programme was initially offered to 140,544 households in 1997, and was expanded to more than 2.6 million recipient households by the end of 1999. This represents approximately 40% of all rural families (Skoufias (2005)).

[17] *Platicas* are directed mainly to mothers, but other family members as well as non-beneficiaries are invited to attend. Various aspects of health and nutrition are discussed, with special emphasis on preventive healthcare. This includes ways of reducing health risks (e.g. prenatal care, early detection of malnutrition), how to recognize signs and symptoms of sickness, how to follow appropriate primary-care procedures.

[18] 10 pesos is approximately US 1$.

until the end of 1999. The sample initially included 24,077 households. Eligibility for the programme was based on poverty level, as defined by a measure of permanent income based on the information collected in the September 1997 census of villages. There were two rounds of selection for eligible households in PROGRESA: 52% of households were classified as poor in 1997 and were therefore eligible for cash transfers. In October 1998, 54% of households initially classified as non-poor, were added to the beneficiary group.[19] Households were informed that, once classified either as poor or non-poor, their status and thus eligibility would not change until November 1999, irrespective of any income variation. Two features of PROGRESA are particularly interesting for our analysis. First, households were clearly informed about their eligibility status and the conditionalities, mainly through village assemblies. Hence take-up rates among eligibles were over 90%. Second, within the household, it was the women who were the recipients of the cash transfers. All residents of both control and treatment villages were interviewed at roughly six month intervals: twice before the programme started (the October 1997 wave and the March 1998 wave) and again in October 1998, May 1999 and November 1999.

Households fall into four groups of eligible, and non-eligible households, in treatment and control villages. Only the eligible households in treatment villages received the PROGRESA transfer.

In the March 1998, October 1998 and May 1999 waves every respondent (usually female) was asked about three different types of screening: cervical cancer (via the PAP smear test), diabetes (blood sugar test) and hypertension (blood pressure testing). In the March 1998 wave respondents were asked whether any household member had been screened in the previous 12 months; in the following two waves this question referred to the previous six months. In addition, in March 1998 respondents were asked about sex related behaviour, including whether contraceptive methods were used, total number of pregnancies and whether or not they had had a PAP smear test.

PROGRESA also collected information about different aspects of health provision at both the village and individual level. The October 1997 and October 1998 locality questionnaires included detailed questions about the type of health infrastructures and services available in the village. The socio-economic questionnaires administered to the March 1998 and October 1998 waves elicited specific

[19] These are usually referred to as *densificados*. A non-random subset of these households began receiving PROGRESA transfers in treatment villages prior to November 1999. As no precise algorithm exists to determine which *densificados* received transfers in treatment villages, there is no counterfactual set of households in control villages.

information about the main characteristics of any health centres attended by any of the household members in the previous six months . Questions enquired about centre opening times, cost of visits, waiting times before being seen, length of visits and whether or not they had received medicines from the doctor.[20]

§1.4. Empirical Analysis

1.4.1 — Preliminary descriptives

This section provides descriptive evidence on the pre-programme levels of screening and how they vary over time, by eligibility status in the treatment and control villages. It also provides a description of how healthcare supply changes over time in treatment and control villages.

In order to compare screening levels during the operation of the programme with those before, we calculate the cumulative probability that any household member is screened either in the six months before October 1998 or in the six months before May 1999. This measure can be directly compared with the March 1998 information. While pre-programme screening rates for high blood pressure and blood sugar show small and insignificant differences between treatment and control villages for both eligibles and non-eligibles, the difference for PAP tests at March 1998 is bigger and especially for non-eligible households, but not significant (see Table 1.2).[21] Our results are consistent with those of Berhman and Todd (1999), who studied the quality of the randomization comparing the equality of the distributions for many characteristics both at village and household (only for the group of eligibles) level. Screening rates show a sharply increasing trend over time for eligibles and non-eligibles in both the treatment and control villages: this result is consistent with the increase in the health supply coverage for treatment and control villages, which we refer to later in this section. In order to measure how screening rates change after programme implementation, we estimate an unconditional Differences in Differences (DD) linear model, with standard errors clustered at village level. As expected, the screening rates for eligibles show a remarkable increase for all the tests (on average above 20%). Among non-eligibles, blood pressure and blood sugar screening rates do not change significantly between the treatment and control groups. In contrast, the DD response

[20] Additional information about the competence and availability of doctors and nurses and how easy it was to understand what they were told, is also available.

[21] In the group of non-eligibles the screening rates of the *densificados* households in March 1998 are significantly lower than those of households whose eligibility status was not revised. For example, the average screening rate for cervical cancer among *densificados* is 29.7% compared to 39.7% for *non-densificados*.

for cervical cancer screening is strong and significantly different from zero: there is a 6.3% increase in the PAP test take up rate for non-eligibles in treatment villages (see Table 1.2).

One of the distinctive criteria for a village to be included in the PROGRESA programme was the presence of basic health services. The upper panel of Table 1.3 provides evidence on the health providers coverage in the PROGRESA villages and how the composition between treatment and control villages varies over time. Consistent with previous work that studied the quality of the random assignment,[22] we find that, at the baseline, the proportion of villages with at least one major health provider does not differ significantly between treatment and control villages. In Mexico there are two main public providers for households not covered by insurance: Health Secretary (*SSA*) and *IMSS Solidaridad*. In October 1997, 13% of the control villages had *SSA* clinics, compared to 8% of treatment villages with a difference significant at 10%. By October 1998 the proportion of villages with at least one *SSA* hospital does not differ significantly between treatment and control villages. No significant changes are observed in the fraction of villages covered by *IMSS Solidaridad* clinics.[23]

Only 4% of the PROGRESA sample is covered by the *IMSS* insurance.[24] This explains why the presence of *IMSS* hospitals is fairly small in the PROGRESA villages and does not vary significantly between treatment and control villages either at the baseline or at October 1998. The auxiliary health units are usually in rather inaccessible rural locations, where populations vary between 500 and 1,000 inhabitants. They can usually rely on the presence of one general practitioner. The mobile health units are composed of both medical and paramedic staff who offer a full set of ambulatory services. Auxiliary health units and mobile units are the most common providers in PROGRESA villages. At the baseline there is a bigger proportion of villages with at least one auxiliary health unit in control villages, while in October 1998 coverage does not differ significantly between treatment and control villages. By contrast, the proportion of villages served by

[22] See Berhman and Todd (1999).

[23] At national level 42% of all Mexican hospitals are run by *SSA*. IMSS Solidaridad is a programme launched by the Mexican Government in cooperation with Mexican Institute of Social Security (*IMSS*) to reach rural populations in marginal areas. The programme currently provides healthcare for 10.6 million Mexicans, 1.2 million of whom benefit from the PROGRESA-Oportunidades programme. In July 2000 the programme has been renamed IMSS Oportunidades.

[24] Participation is compulsory for workers employed in the formal sector. The self-employed can join on a voluntary basis. Public employees are covered by the Institute of Social Security for Public Employees (*ISSSTE*) but they represent a negligible fraction of the PROGRESA sample. At national level, *IMSS* and *ISSSTE* clinics make up approximately 33% of all hospitals and 12% of the ambulatory care facilities.

mobile units is higher for treatment than control villages in October 1997 but becomes significantly not different once the PROGRESA programme is in place. While on average *SSA* and *IMSS Solidaridad* hospitals are bigger, and better equipped than health aides centres and mobile units, all offer the three types of screening tests.

The lower panel of Table 1.3 provides evidence on some health supply outcomes. The average number of health services available in the village[25] increases sharply in October 1998, but does not differ significantly between treatment and control villages. Taking account of the village averages of individual responses, we can provide evidence on average waiting times for individuals to be seen, opening times of centres, average duration of visits and consultation fees. Baseline differences between treatment and control villages are not significant, except for duration of visits, which is slightly longer in non-treatment than in treatment villages. PROGRESA does not result in significant changes in waiting times, opening times or visit duration.

While cervical cancer screening is provided free of charge for both eligibles and non-eligibles under the CCSP, women could decide to undertake this screening within a more general medical consultation. In this case the fee charged by the doctor for the visit would represent the real cost of the screening. For the October 1998 wave the average consultation fee for treatment and control villages dropped dramatically, but the reduction is significantly bigger for the treatment villages. This is due to the eligibles accessing health centres free of charge as part of the programme conditionalities.[26] These results, along with the screening coverage described above, suggest that health services were strengthened equally in treatment and control villages, producing an increase in the number of services available and a reduction in prices for both groups. Improvements in health facilities in the control villages might have been carried out ahead of the programme implementation at the end of 1999. This is consistent with the observed upward trend in screening rates for non-eligibles in the treatment and control villages. However, as noted above, only cervical cancer screening differs significantly between treatment and control villages (see Table 1.2).

[25] These are taken from the 7 services listed in the locality questionnaire: prenatal care, delivery care, infant care, vaccination, diarrhoea treatment, family planning and hospitalization.

[26] Our estimates show a small and insignificant indirect treatment effect of PROGRESA on the consultation fee, as opposed to a negative, sizeable and significant treatment effect for eligibles.

1.4.2 — Model of demand and supply of screening

In this section we propose a framework to identify how PROGRESA can affect the demand for screening from non-eligible households. The model draws on the literature that relates waiting times to service demand and supply (see Lindsay and Feigenbaum (1984), Gravelle (1990), Blundell and Windmeijer (2000)). In this framework the village average waiting time acts as the price of the health services for households in the community. There are two main reasons why we chose waiting time rather than a more 'standard' price. First, screening tests are free for women independent of the status of the village and the health provider. Second, the average consultation fee would not represent the true cost sustained by non-eligibles in treatment villages, as eligibles access health facilities for free as part of the conditionalities.

Formally, in each village j there are N_j^{NE} non-eligible households and $N_j^E \equiv N_j - N_j^{NE}$ eligible households. Within non-eligible households, each individual will be assumed to undertake screening at any point in time if it yields a greater expected utility than non-screening, where the uncertainty is due to the probabilistic nature of the disease being screened.[27] For each member of household i the net benefit of screening is assumed to be positively correlated with the expected payoff of the test, and negatively correlated with the average waiting time to access health services in the village, W_j. Since the data only provide information on whether at least one household member was screened, we model the demand for screening at the household level. Let q_{ij}^{NE} be a binary variable that takes the value 1 if at least one member of household i in village j is screened, and 0 otherwise.

While in the next sections we will provide evidence on the mechanisms through which PROGRESA affects the expected benefit from screening, in this section we want to test whether PROGRESA has a significant effect on the demand for screening. The reduced form demand equation for screening of household i in village j can be written as:

$$q_{ij}^{NE} = 1(X_{ij}, T_j, W_j, v_{ij}) \tag{1.1}$$

where $1(\cdot)$ is an indicator function. X_{ij} is a set of socio-demographic characteristics of household i in village j, T_j takes the value 1 if village j is covered by PROGRESA, and 0 otherwise; W_j is the average waiting time to access a generic health centre in village j. v_{ij} represents the unobserved characteristics correlated

[27] Another potential source of uncertainty that we do not consider in this work is related to the effectiveness of the treatment once the disease has been diagnosed (see Picone et al. (2004)).

with the decision to screen. The aggregate demand for preventive screening in village j is given by:

$$D_j = \sum_{i=1}^{N_j^{NE}} q_{ij}^{NE} + \sum_{k=1}^{N_j - N_j^{NE}} q_{kj}^{E} \tag{1.2}$$

where D_j represents the proportion of both eligible and non-eligible households that demand for screening and is negatively correlated with W_j. We assume that in each period the supply of health facilities in the village, S_j, is given and is inelastic with respect to W_j. The market for screening services is in equilibrium if the observed waiting time, W_j, is equal to the waiting time W_j^* at which demand and supply of screening intersect:

$$D_j = S_j \Leftrightarrow W_j = W_j^* \tag{1.3}$$

While we want to test whether the programme affects the demand for screening from non-eligible households, q^{NE}, eq. 1.2 and eq. 1.3 show that the programme might affect the screening rate of non-eligibles through two different mechanisms. First, the higher demand of eligible households might crowd out the demand for screening by non-eligible households. Second, health supply, S_j, might improve in PROGRESA villages, benefiting both eligibles and non-eligibles. The underlying assumption of the model is that these two mechanisms affect q_{ij}^{NE} through the waiting time, W_j.

In order to estimate the effect of PROGRESA on the demand for screening from non-eligible households we estimate the following demand equation with a probit model:

$$q_{ij}^{NE} = \phi(\beta' X_{ij} + \gamma T_j + \delta_1 W_j + \delta_2' H_j + v_{ij}) \tag{1.4}$$

X_{ij} includes household head's characteristics,[28] the proportion of eligibles in the village, the total number of households in the village and state fixed effects. H_j is a vector of the dummy variables that control for the type of provider in the village.

We are interested in estimating the indirect treatment effect of PROGRESA (ITE) on the demand for screening, namely the parameter γ[29] in eq. 1.4. Since

[28] These controls are household head's gender, age and its square, literacy status, whether (s)he speaks the indigenous language, the household poverty index, the household's size, number of children, whether there are females in the age group 25-64, and the proportion of women over 18 with a secondary school degree.

[29] In a probit model the marginal effect is a function of the coefficient as well as of the derivative

waiting time affects the screening decisions of non-eligibles, and waiting time can be affected by the screening decisions of non-eligibles (as well as of eligibles), positive demand shocks will lead to longer waiting times, so that waiting time and the error term are positively correlated. Although the elasticity of demand for screening with respect to the waiting time is not relevant for our purposes, the endogeneity of W_j would threaten identification of the ITE if W_j and T_j are correlated. In our empirical analysis we account for this possibility by instrumenting the waiting time with variables that can affect it only through the supply side.

Three basic assumptions are needed to identify the ITE of PROGRESA on the demand for screening. First, we assume there are no spillover effects from treatment to control villages, so that the demand for health services is driven by whether they live in a treatment village or not and not by the status of other villages. Second, we assume a random assignment of villages into treatment and control groups. This is equivalent to assuming that whether a household is in a treatment or a control village is independent of unobservables that might affect the demand for health services. These two assumptions of no cross village spillovers and random assignment are standard requirements for the identification of the ITE[30] and are equivalent to assuming that non-eligibles in control villages provide a valid counterfactual for non-eligibles in treatment villages in terms of health service utilization. To provide support for the first assumption we note that villages were included in the evaluation data because they were geographically distant. With respect to the second assumption, it has already largely documented (Schultz (2004) and Berhman and Todd (1999)) that household and village characteristics do not significantly differ across treatment and control villages, which is consistent with the random assignment. Third, we assume that PROGRESA affects the health supply only through waiting time and composition of health providers. While this assumption might at first seem overly strong, in the next section we provide evidence to support it.

Since we cannot completely rule out the presence of pre-programme differences in the prevalence of a certain disease and/or the possibility to screen for it,[31] we estimate eq. 1.4 using a DD strategy.

of the conditional density function. For notational simplicity, in this work we will use the coefficient when referring to the marginal effect.

[30] See Angelucci and De Giorgi (2006) and Angelucci et al. (2007).

[31] This might be related to the distance from a bigger hospital where screening tests can be performed more accurately and more quickly.

1.4.3 — Baseline results

We first estimate the ITE of PROGRESA, as described in eq. 1.4, on four different outcomes: testing for cervical cancer, diabetes and hypertension and the probability of at least one visit to health centres. The marginal effect of the interaction between the treatment status of the village (T) and the survey round when PROGRESA was first in place (*98o*) presented in Table 1.4 measures the effect of the programme on the demand for screening of non-eligibles. PROGRESA leads to a 5.5% increase in the demand for cervical cancer screening among non-eligibles. Comparing this effect with the overall increase due to the programme shown in Table 1.2, suggests that the variation in health supply plays a fairly limited role in explaining the indirect effect of the programme on cervical cancer screening. Later in this section we provide a more accurate benchmark to assess the size of the demand effect with respect to the supply effect. We do not find any significant evidence of ITE on either demand for other types of screening or health centre attendance.

We now compare the ITE with the average treatment effect on eligibles, the so called treatment on the treated effect (TTE). Table 1.5 shows that there is a significant increase of over 20% in the probability of an individual undertaking the screening tests. The treatment effect for the eligibles on the probability of accessing a health centre is around 16%.[32] While there is no evidence of the effect of PROGRESA on the screening behaviour of eligibles, the TTE on health centre visits is consistent with previously documented effects of PROGRESA on health centre attendance.[33] The presence of a *SSA*, an *IMSS Solidaridad* clinic and a medical aid centre significantly increases the level of screening for both eligibles and non-eligibles. Due to the limited *IMSS* social insurance coverage, the presence of an *IMSS* clinic has either a negative or a not significant effect on the access to health services. We would expect the waiting time coefficient to be upwardly biased because of the reverse causality problem and this could account for the positive coefficient in Table 1.4.

We address possible endogeneity by instrumenting the waiting time with the average weekly opening days of health providers in the village, and its square. The validity of the instrument relies on two assumptions. First, that the opening days of a health service affect the screening probability only through the waiting

[32] In March 1998 and October 1998 respondents were asked about health centre attendance in the previous 6 months.

[33] Gertler (2004) using hospital data found that in 1998 the number of visits was about 8% higher in treatment than in control villages.

time. Second, that the opening times do not change in response to the increased demand for health services driven by the programme. Potential violation of the first assumption would arise if health providers that are better equipped for the performance of screening tests are open on more days, but we found no evidence of this.[34] In support of the second assumption, in the previous section we showed that there is no significant change in opening times once PROGRESA is implemented. Table 1.6 shows that when we control for the possible endogeneity of waiting time both the ITE and the TTE are in line with those discussed above.[35] These results can be read as evidence that the programme had a non-trivial indirect effect on the demand for female specific screening, compared with a small and insignificant effect on non-gender specific health outcomes. Since our ultimate goal is to understand how the indirect effect on the demand for cervical cancer screening is related to its gender specific nature, we need to explore a variety of mechanisms.

First, because of the income spillover from eligible to non-eligible households already documented in previous works (Angelucci and De Giorgi (2006)), the programme might have shifted upward the demand for health services from non-eligible households. Hence, women are being screened for cervical cancer more often just as result of the higher propensity to use health services among non-eligibles. While the lack of a significant effect on other health outcomes seems to exclude this explanation, we provide further evidence by testing whether the programme increased non-eligibles' expenditure on medicines and consultations with a doctor. The results in Table 1.7 do not show any significant evidence of ITE on health related expenditure. This finding is consistent with the results in Angelucci and De Giorgi (2006), which did not find any indirect effect on the consumption of durable goods. We also do not find any significant evidence of a treatment effect on the eligibles. This might be related to the fact that poor households receive medicines and treatment under the programme. Taken together, these results suggest that the significant response for non-eligibles in terms of cervical cancer screening is not due to an increased demand for health services generally, from non-eligible households.

So far we have assumed that PROGRESA would affect the supply of health services by increasing the amount of health provision. This is a restrictive as-

[34] When we control for the type of providers that operate in the village we do not find any significant correlation between the number of services available in the village and the opening times either at the baseline of October 1998.

[35] In order to check the validity of the village waiting time as a measure of the health services, we allow the treatment effect to interact with the waiting time. The sign of the interaction is negative and significantly different from zero.

sumption. As emerged from the description of the food and health component, PROGRESA might have improved the 'quality' of the health supply in treatment villages. In particular, since the programme is mainly targeted at pregnant and lactating women, doctors operating in treatment villages might have gained a better knowledge of female specific conditions either by attending training courses or receiving specific guidelines. This might explain the significant indirect effect on cervical cancer screening but not on other screening procedures. In order to investigate this opportunity, we estimate the ITE on two prenatal care outcomes: the number of checks during pregnancy and whether the pregnant woman was administered a tetanus vaccination. The rationale behind this is straightforward: if the programme has improved the ability of the doctors to deal with female specific issues, we should observe a change in pregnancy related outcomes as well. Results in Table 1.8 display a negative and insignificant indirect effect of the programme on pregnancy related outcomes, as opposed to a positive average treatment effect for eligibles. Another potential issue related to the quality of health providers might be related to the substitution of public care with private care. Consistent with the findings of Gertler (2000), we do not find any evidence of a change of healthcare provider for non-eligible households.

We have shown that PROGRESA has a large and significant effect on the demand for cervical cancer screening from non-eligibles. We now try to assess the size of this demand effect compared to the supply effect. Table 1.3 shows that in control villages between October 1997 and October 1998 there was an increase in the number of villages with at least one major health provider and a reduction in the proportion of villages covered by a *SSA* hospital. In the same time interval, there has been a significant increase in the number of available services and a reduction in the average consultation fee. Since households living in control villages would receive the cash transfer only at the end of 1999, we study how screening behaviour varies over time in control villages in order to isolate the effect of changes in health supply due to the programme. In Table 1.9 we present the results of two specifications, the second of which includes a full set of supply controls at village level, including the distance from a *SSA* hospital and the number of services available.[36] In the first specification the time dummy captures variations related and unrelated to the programme. When we include the supply-side characteristics the estimated coefficient on the time dummy shrinks for all three screening tests. Reassuringly, the effect of supply is relatively small.

[36] Villages with a *SSA* hospital not included in the evaluation sample might be closer to the control villages. We assume that the over time variation in the distance as measured in our sample is a good proxy for changes in the availability of *SSA* hospitals.

For the group of non-eligibles changes in supply account for an approximate 1% increase in the probability of cervical cancer screening over time. This result allows us to conclude that the indirect effect of PROGRESA on the demand for cervical cancer screening is about five times greater than the effect of changes in supply. The coefficients of the distance from a *SSA* hospital and the number of available services are significant and have the expected sign.

Our results are robust to a variety of checks. In appendix A we present some results for specific checks. The lack of a significant effect on non-gender specific health outcomes might hide responses to the programme that vary differentially with the age and gender composition of the household. While systematic screening for cervical cancer is recommended mainly for women in the 18-30 age group, it is recommended that blood pressure and blood sugar levels are checked annually only after the age 45. In order to test whether the effect of PROGRESA on screening for high blood pressure and high blood sugar is greater for households that include at least one woman aged 45 or over, we split the sample of non-eligibles and estimate the model in eq. 1.4 for each separately. Table A.1 shows that for both samples the ITE on blood pressure and blood sugar screening and health centre visits is not significantly different from zero. The ITE on cervical cancer screening is above 5% and strongly significant for both samples.

We also test the validity of the waiting time as the "price" of the screening services in the village. While the consultation fee calculated as the average of the prices paid by the entire village population would be a lower biased measure of the monetary cost paid by non-eligible households for health checks, we estimate eq. 1.4 taking village price as the average fee paid by the non-eligibles. Even though the marginal effect of the price should be interpreted with care, estimates of the ITE confirm our earlier conclusions (see Table A.2).

To summarize, the evidence suggests that the magnitude of the ITE on the demand for cervical cancer screening is non-trivial. Also, the response to PROGRESA from non-eligible households is not driven by changes in the "quantity" or the "quality" of supply. Unlike existing studies on the indirect effect of PROGRESA on consumption, we found no evidence that the ITE is due to income spillovers from eligibles to non-eligibles. Understanding how this effect is related to the gender specific nature of the test is the objective of the next section.

§1.5. Transmission mechanisms

We formally test for two mechanisms (not necessarily exclusive) that might explain how PROGRESA has increased the demand for cervical cancer screening from

non-eligibles, i.e. social norms and information sharing.

By social norm we mean that the individual decision to seek screening for cervical cancer is socially regulated. Descriptive evidence discussed in section 1.2.2 suggests that one of the most common reasons for women not having the PAP test is fear of their partners' reaction, especially if the test is performed by a male doctor.

By information sharing we mean that women who have been screened for cervical cancer might share information with their own peers about the existence and the nature of the PAP technology and also other information received from the doctors. This latter might include information about potential risk factors involved in lack of systematic screening and sexual behaviour.

Since both female status and information about cervical cancer risk factors are strongly correlated with socio-economic status, it is *a priori* difficult to distinguish between them. The strategy we adopt in this paper to separate the two exploits the substantial heterogeneity between male and female headed households in terms of female status and cervical cancer risk factors. In this section we show that while female respondents in male headed households display higher levels of formal education and lower risks of contracting cervical cancer than those in female headed households, the latter are more emancipated and less likely to be affected by the gender bias. Therefore, if PROGRESA affects the screening decisions of non-eligibles by reducing the cost of the social norm, we would expect this effect to be stronger in the sample of male headed households. On the other hand, if the programme generates information spillovers about different aspects of cervical cancer screening, the indirect effect should be stronger in the sample of female headed households.

At the baseline 14% of the 11,558 non-eligible households are female headed of which 71% are widows. First, we test whether the screening behaviour of male and female headed households systematically differs and whether the ITE effect of PROGRESA on screening behaviour varies with the gender of the household head. The results in Table 1.10 show that the dummy that controls for the gender of the household head has a large and significant negative effect on the probability of screening for cervical cancer. While living in a female headed households increases the probability of screening for high blood pressure, it is negatively correlated with the probability of screening for diabetes. In both cases the estimated marginal effects are much smaller than for cervical cancer screening. This result can be interpreted as evidence that there are no systematic differences in the screening for non-gender specific diseases between male and female headed house-

holds.

The ITE effect of PROGRESA on the probability of screening for cervical cancer does not vary significantly with the gender of the household head and is large and significant for both male and female headed households. Results for blood pressure and blood sugar tests confirm that the programme has no indirect effect on the probability of screening for non-female specific screening diseases, irrespective of the gender of the head of household.

We also examined how observable characteristics correlated with the risk of contracting the cervical cancer are distributed in the sample of male and female headed households. The upper panel of Table 1.11 shows that female heads are on average older and less educated. Male and female headed households are not significantly different when measured on the poverty index and in terms of the proportion of households where the household head speaks the indigenous language.[37] The proportion of women in the age group more at risk of contracting cervical cancer is significantly higher in female than in male headed households. In female headed households the percentage of women age 18 or over who have completed secondary education is 7% versus 13% in male headed households. The results in the lower panel of Table 1.11 show that female heads are more likely to have never used any form of contraception and to have had more pregnancies. There is no significant difference in the probability of having been screened for cervical cancer in the past.

While so far we have assumed that women in female headed households are not affected by the gender bias in the decision to screen for cervical cancer, the PROGRESA dataset contains measures of female emancipation and allows us to measure how they correlate with sex related behaviour. In the March 1998 wave all female respondents were given a set of questions about women's status. In particular, they were asked if they agreed or disagreed with the following statements: i) Woman's place is in the house; ii) Women have to obey men; iii) Women have their say in community issues; iv) Women should have a job outside the house; v) Women should have same rights as men; vi) Women should have their own opinions. We converted the answers to these questions into dummy variables and derived a Female Status (FS) index ranging between 0 and 6, where 6 represents the lowest degree of female emancipation. Figure 1.2 shows the

[37] As a further check on whether male and female headed households differ in the overall distribution of observable characteristics potentially correlated with the decision to screen, we estimate a propensity score based on observable characteristics elicited either on October 1997 or March 1998. Figure A.1 reports the results for the group of non-eligibles. Overall female and male headed households seem quite balanced in terms of household and village characteristics.

distribution of this index by gender of the household head for the group of non-eligible households. As expected, female heads display, on average, higher levels of emancipation than females in male headed households.[38] Table 1.12 shows that the *FS* index is significantly correlated with PAP testing and use of contraceptive methods (as reported in March 1998) only for the sub sample of male headed households.

On the assumption that the level of emancipation of the female respondent is a good proxy for the average level of independence of the women in the household, these results suggest that women in female headed households, while less educated (potentially less informed) and more at risk of contracting cervical cancer are, on average, not affected by the gender bias towards screening for cervical cancer. In the next section we propose a simple model of social norm diffusion. We derive and test implications for how PROGRESA might have affected the social acceptability of the PAP test. In section 1.5.2 we test for the presence of knowledge spillovers.

1.5.1 — Social Norm

We first propose a simple model of screening behaviour with social regulation. Our characterization of social norm is close to those proposed by Munshi and Myaux (2006) and Kandori (1992). While the long run equilibrium of social norm diffusion is characterized in detail in these models, the objective of our framework is to show how PROGRESA affects the strength of the social norm that regulates cervical cancer screening, in the short run.

Consider a village consisting of a continuum of women. At the beginning of each period a woman can choose between two actions: screening for cervical cancer (s) and not screening (ns). When screening behaviour is socially regulated, its payoff depends not only on the intrinsic utility that she derives from screening but also on the social pressures or sanctions that accompany it. Within each community the cost associated with the social norm, l_i, varies across women and is assumed to be normally distributed with $l_i \sim N(\bar{l}, \sigma^2)$. In our framework the individual's payoff depends on her action, as well as on her peer action.

We assume that in each period each woman can only be matched with one other woman in the village. Before implementation of the programme households that are potentially eligible and those that are not eligible for a cash transfer have the same payoffs, which correspond to four combinations of actions:

[38] Both a Pearson chi square test and a Kolmogorov Smirnov test strongly reject the hypothesis that the two samples are drawn from the same distribution.

$$V_i(s,s) = w \tag{1.5}$$

$$V_i(s,ns) = w - l_i \tag{1.6}$$

$$V_i(ns,ns) = 0 \tag{1.7}$$

$$V_i(ns,s) = 0 \tag{1.8}$$

V_i is the payoff for woman i, where the first term in parentheses refers to the woman's own action and the second term refers to her peer's action (for simplicity we assume that the payoff for cervical cancer is constant); and l_i is either the husband's reaction or simply her fear of his reaction. The underlying intuition is that husbands would punish their wives if their behaviour does not conform to the behaviour of most of the community. We assume that the expected loss of utility from the decision not to screen is equal to 0, independent of peer action.[39] In each village there is a fraction P of women who undergo screening for cervical cancer, where P is given by:

$$P = \mu p^E + (1-\mu)p^{NE} \tag{1.9}$$

μ is the exogenous fraction of village households potentially eligible for the PROGRESA transfer, p^E is the average screening probability of women eligible for the cash transfer; p^{NE} is the average screening probability of women not eligible for the cash transfer. Every woman will opt for screening if

$$Pw + (1-P)(w - l_i) \geq 0 \tag{1.10}$$

When PROGRESA is introduced, the expected payoff for women eligible for the PROGRESA transfer increases ($w^{'} > w$) in treatment villages, but not in control ones. As a result, p^E only increases in treatment villages. Among non-eligible women those with $l_i \leq l^{*NE}$ will screen for cervical cancer, with l^{*NE} given by:

$$l^{*NE} = \frac{w}{(1-P^*)} \tag{1.11}$$

and P^* given by:

[39] Alternatively we could assume that there is social reward for the woman who decides not to screen and is matched with a woman who does have the test (Munshi and Myaux (2006)).

$$P^* = \mu p^E + (1-\mu) \int_{-\infty}^{\frac{w}{(1-P^*)}} \phi(l) dl \tag{1.12}$$

Taking the derivative of l^{*NE} with respect to P^* in eq. 1.11 and applying the implicit function theorem to eq. 1.12, we can derive how the equilibrium social norm of non-eligibles varies in response to an increase in the screening probability of eligibles:

$$g \equiv \frac{\partial l^{*NE}}{\partial p^E} = \frac{w}{(1-P^*)^2} * h(P^*, w, \mu, \bar{l}, \sigma^2) \tag{1.13}$$

where $h(\cdot)$ is a positive function with the following properties: 1) $\frac{\partial h}{\partial \mu} > 0$; 2) $\frac{\partial h}{\partial \mu \partial \bar{l}} > 0$. Function $h(\cdot)$ describes how the fraction of women in the village that go for screening, P, changes as result of changes in the screening probability of eligible women, p^E. Previous work on social norms (see Munshi and Myaux (2006)) has modeled social norm diffusion as a learning process over time: people gradually learn about P, constantly updating their priors. In our case, even though women living in treatment villages had no information about the pre-programme screening rate in the village, they know how it varies because of the programme. Between October 1997 and August 1998, PROGRESA held public meetings where the eligibility of each household and the conditionalities were spelt out. Moreover, after the programme started a community outreach worker, known as the *promotora*, chosen from among the eligibles, was responsible for providing information about the programme throughout its duration.[40] Therefore, all the non-eligible women in the treatment villages were informed about who was required to undergo PAP testing as part of the conditionalities of the cash transfer.

The model has two testable implications. PROGRESA increases the screening probability of non-eligibles by shifting upward the threshold value of the cost of the social norm, below which non-eligible women screen for cervical cancer. The bigger the fraction of households eligible for the programme, the greater the size of the shift. The variation in the indirect effect driven by the proportion of eligibles should be stronger in those communities where the social norm cost is higher.

In order to test these implications we estimate the model in eq. 1.4 allowing the ITE to vary with the proportion of eligibles in the village:

[40] Even though the promotora was mainly meant to be contacting beneficiaries, Adato et al. (2000) reports show that there were also frequent interactions with non-beneficiaries.

$$q_{ij}^{NE} = \phi(\beta' X_{ij} + \gamma_1 T_j + \gamma_2 rp_j + \gamma_3 T_j * rp_j + \delta_1 W_j + \delta_2' H_j + v_{ij}) \qquad (1.14)$$

where rp_j is the ratio of eligibles in the village j.[41] The evidence provided in the previous section suggests that before the programme women's emancipation levels in male headed households are significantly correlated with the decision to have screening, but not in female headed ones. Therefore, we expect γ_3 to be higher for male than for female headed households. Further, we exploit variations in the *Female Status* index at village level to test whether γ_3 is higher in those communities where the average social norm is stronger.[42]

So far we have exploited variations in the gender of the household head, but the cost of the social norm might vary across male headed households. In particular, enforcement of the social norm might be stronger in those households with more conservative male heads. If so, the ITE should vary with the characteristics of the household head in the group of male headed households, but not in the female headed ones. An enforcement mechanism could be based on internalization of the norms of proper conduct (see Young (2007)). Although female widows need no longer fear their partners' reactions, they might have internalized their dead husbands' opposition to cervical cancer screening. Therefore the indirect effect should be stronger among widowed female heads than others.

Table 1.13 show how the ITE varies with the proportion of eligibles in the village. Consistent with our theoretical predictions, the ITE increases significantly with the proportion of eligibles in the village. On average, a 10% increase in the proportion of eligible households determines a 1.4% increase in the ITE. When we estimate our model separately for the sample of male and the sample of female headed households, we find that the interaction is strong and significant only in the sub-sample of male headed households.[43]

In order to test whether the response to the programme varies across villages according to level of female emancipation, we split the sample of villages according to the average value of the Female Status index and estimate the model in eq. 1.14 for each tercile. In the first column of Table 1.14 (*High*) the analysis is restricted

[41] The ratio varies between 0.19 and 1 with the average being 0.59.

[42] While the value of the *Female Status* might not necessarily reflect the severity of the penalties inflicted by husbands, we assume that the average level of female emancipation is a good proxy for the strength of the social norm in the community.

[43] We rule out the possibility that the differential effect between male and female headed households is driven by an age effect. Estimates on a sample of household heads aged 60 or under show similar results.

to those villages where women are on average more emancipated. While the ITE is strong and significant, its interaction with the proportion of eligibles in the village is not significantly different from zero. In the second column, (*Medium*), where the analysis includes only those villages with an average level of female emancipation, neither the ITE nor its interaction with the proportion of eligibles, is significant. In the last column of Table 1.14 (*Low*) only women who live in the least emancipated villages are included. We find that the interaction between the ITE and the proportion of eligibles is strong and significant. This result could be taken as evidence that the effect of the programme on the social norm is convex with respect to its strength. The presence of an ITE that does vary significantly with the proportion of eligibles in the villages characterized by high levels of female emancipation suggests that mechanisms other than the social norm might explain the ITE on cervical cancer screening.

Next we look at how the size of the ITE varies with the characteristics of the household head. As mentioned earlier, these characteristics could proxy for the strength of the social norm in male headed households, but not in female headed ones. There is a large body of medical literature (see Stephens (2005) for a summary of the existing evidence) documenting how difficult it is for the indigenous female population to access health services. In order to test whether these difficulties are related to restrictions imposed by the husband, in the first specification we interact the treatment effect of the non-eligibles with the dummy for the household head speaking the indigenous language or not.[44] We find that the interaction of the treatment effect with the indigenous status dummy has positive, non-trivial and significant marginal effects for the sample of male headed households, as opposite to negative and not significant effects for the sample of female headed households. In the second specification we interact the treatment effect with a dummy variable that takes the value 1 if the household head is over 60 and 0 otherwise. Again, the marginal effect on the interaction is positive and significant only for the sub sample of male headed households. Finally, we allow the treatment effect to vary with a dummy variable for whether the head of household is illiterate or not and, consistent with the previous results, we find that the interaction is strongly significant only for the sub sample of male headed households. In principle, the variables we interacted with the treatment effect might not necessarily proxy for the strength of the social norm within the household. However, explanations other than the social norm-based one would

[44] 9 million Mexicans have indigenous origins and live mainly in dispersed rural areas. Among the indigenous population, the rate of illiteracy among females is almost double that for males.

have shown the interactions to be significant also for the sub sample of female headed households.

Last, we study whether in the group of female headed households, the indirect effect of the programme varies with the household head being a widow or not. The results in Table 1.16 show there is a sizeable and significant effect for widows, and a smaller and insignificant effect for non-widows.[45] Taken together, these results suggest that PROGRESA weakens the social norm related to male opposition to women being screened for cervical cancer. The effect is particularly strong for women in male headed households, but women living in less emancipated female headed households also benefit from the increased social acceptability of the PAP smear test.

1.5.2 — Information sharing

Our final analysis tests whether learning contributes to explaining the indirect effect of PROGRESA in the decision to screen for cervical cancer. As already mentioned, a social norm based explanation does not exclude the fact that there are other influences. Women who take the PAP test to comply with the programme conditionalities might potentially share information about different aspects of cervical cancer screening. Eligible women might inform their peers about the existence of PAP technology and the experience of the actual test. They might pass on information provided by the doctor about risk factors and recommended frequency of screening. In the absence of direct questions about cervical cancer screening we are not able to separate these two channels.

In order to test whether eligible women share information with non-eligible women we rely on a prediction common to many social learning models in the literature. If there is learning through peers the learning externality should be bigger for those individuals who have less accurate initial information.[46] Testing this prediction poses many difficulties. First, the set of neighbors from whom a woman might learn about cervical cancer is difficult to define. Then, once a meaningful group has been chosen, we have to deal with the problems described in the literature that tries to identify peer effects,[47] namely the presence of so called

[45] Consistent with our social norm based explanation when we allow the treatment effect to interact with the *Female Status* index the interactions is positive and significant only for the sample of widows.

[46] Bandiera and Rasul (2006) and Conley and Udry (2005) test this implication in a study of whether farmers' decisions about whether or not to adopt a new technology are affected by their neighbors' decisions.

[47] See among others Manski (1993) and Sacerdote (2000).

correlated effects (e.g. shocks that affect the network as a whole[48] and creates spurious correlation between individual decisions and peer actions) and produces the *reflection* problem (within a peer group every individual's behaviour affects the behaviour of the others and it is impossible to distinguish whether one's action is the cause or the outcome of peer influence).[49] Finally, we need to find a suitable proxy for the initial level of information about cervical cancer. How we deal with these problems and how we specify and test our model is described below.

We define our main network grouping as all those households in the village whose eldest child is in the same school grade, as recorded in the October 1997 wave.[50] While this might be only one of several possible network groupings,[51] there are good reasons for believing it to be appropriate for studying cervical cancer screening decisions. First, Cattaneo and Lalive (2006), studying the indirect effect of PROGRESA on schooling decisions, argue that there might be substantial exchange of information among parents of children in the same grade. Second, given the small number of households in each village (the average is 67), mothers with children in the same grade are not only likely to be of similar age, but since they obviously were pregnant at the same time, they may have exchanged information on sex related issues. The average size of peer groups defined in this way is relatively small (5.42 households), and the average age of the household head is younger than in the full sample (43 versus 47 years). Since it is beyond the scope of this work to determine the most relevant network for the sharing of cervical cancer information, in the appendix we test the robustness of our results with alternative definitions of peer groups.

In order to identify the *endogenous* peer effect in cervical cancer screening decisions we rely on the so called *partial population experiment* introduced by Moffitt (2001): a policy intervention targeted at a subgroup of the population allows identification of the endogenous peer effect in the form of an exclusion restriction.[52] Because of the PROGRESA conditions, the proportion of women

[48] For example, all households in a particular network might be under the care of a not very well informed doctor. This is comparable to the teacher effect in schooling decisions (see De Giorgi et al. (2007), Hoxby (2000)).

[49] See Manski (1993).

[50] This rules out the possibility that the size of the group is affected by the increased incentives to enroll children in school.

[51] Direct data on information sharing are typically unavailable. Most of the literature makes assumptions based on different proximity criteria. Exceptions include Conley and Udry (2005).

[52] Bobonis and Finan (2006) and Cattaneo and Lalive (2006) follow this identification strategy to estimate the impact of peer effects on the schooling decisions of children living in non-eligible households.

who go for screening in each group exogenously increases in the treatment, but not in the control villages.

We use information about whether the female respondent has ever used contraception methods (as recorded in March 1998), as a proxy for initial information about cervical cancer. According to the medical literature the only contraception method that reduces the risk of contracting the HPV virus through sexual contact is the condom. However, in our sample only 2% of non-eligible women professing to use contraception relied on this method. For the purposes of this analysis, we interpret use of contraception as an indicator of knowledge about sex related issues.[53]

We estimate the following equation using a probit model:

$$q_{igj}^{NE} = \phi(\alpha + \beta x_{igj} + \gamma_1 \overline{Q}_{gj} + \gamma_2 c_i + \gamma_3 \overline{Q}_{gj} * c_i + \delta_1 W_j + \delta_2' H_j + u_{igj}) \quad (1.15)$$

In our framework, q_{igj}^{NE} takes the value 1 if a woman living in a non-eligible household i belonging to peer group g in village j, undergoes screening for cervical cancer,[54] x_{igj} is a set of household characteristics, $\overline{Q}_{gj}$ is the average screening rate for group g in village j, c_i takes the value 1 if the female respondent in household i has never used any method of contraception. W_j and H_j are controls for health supply, described earlier in the paper. In this specification, γ_3 shows how the peer effect varies with the proxy for initial information about cervical cancer. A learning based explanation would imply that the interaction is positive and significantly different from zero.

So far we have argued that use of a contraceptive method proxies for the quality of women's initial information on cervical cancer. We might also expect use of contraception to be correlated with female emancipation. The results in the previous section show that the use of contraception is strongly correlated with the level of female emancipation in male headed, but not in female headed households. The latter display lower levels of formal schooling. Overall, this evidence suggests that if our model is effectively capturing a learning externality, we would expect γ_3 to be significantly bigger for the sample of female headed households.

In order to control for the possible endogeneity of $\overline{Q}_{gj}$, we use an Instrumental Variables approach. Our strategy recognizes that within each peer group there

[53] Among the women who answered no to the question about whether or not they wanted another child, 69% stated they were not practising any form of contraception.

[54] For simplicity, we suppress the index t.

might be variability in the number of payments received by the eligibles. Since payments are correlated with the number of medical check-ups attended by the eligible household member(s), a higher average number of payments determines higher exposure of the peer group to medical treatment. Therefore, we use as instruments the treatment effect ($T_j * 98o$), the average number of payments received by the eligibles in the peer group at October 98 ($\overline{NP}_{98o}$), and their interaction ($T_j * 98o * \overline{NP}_{98o}$). This strategy allows identification of endogenous social interactions based on within-village variation in the number of payments across groups. Results are reported in Table 1.17.

The first column of Table 1.17 presents the estimates for the full sample and columns 2 and 3 report the results for the male and the female headed samples respectively. A 10% increase in the proportion of women undergoing screening in the peer group increases the probability of screening for cervical cancer by 4.9%.[55] The magnitude of the marginal effect is similar to that estimated by Cattaneo and Lalive (2006) when measuring peer effects in schooling decisions. In households where the female respondent has never used contraceptive methods the screening probability is significantly lower and, more important for our purposes, the peer effects are stronger. Consistent with our learning based explanation, the interaction between average screening rate and contraceptive use is sizeable and significant only for the sub sample of female headed households. We do not put too much emphasis on the magnitude of the learning externality as this might be downward biased. In fact households with older heads are excluded from the sample because of our peer group definition. While we cannot assess the size of the learning externality, these results show that there is a significant knowledge spillover providing greater benefit to those women who are more at risk.

The validity of our identification strategies relies on the assumption that the only way that PROGRESA affects the response in terms of screening of non-eligibles is by exogenously increasing the screening rate of eligibles. The results in section 1.4.3 rule out the possibility of income spillovers from eligibles to non-eligibles, but there may be other mechanisms threatening our identification strategy. First, in the presence of complementarities between consumption and health status, rates of cervical cancer screening might increase as a result of the positive indirect effect of the programme on consumption documented by Angelucci and De Giorgi (2006) and Angelucci et al. (2007). The lack of a significant ITE on health outcomes other than cervical cancer screening, provides enough elements

[55] Consistent with the baseline results, we do not find evidence of peer effects on screening for high blood pressure and diabetes and health centre visits.

to discard this explanation. Second, Grossman (1972) predicts that the investment in health might increase as a response to an increase in wages. Since one objective of the programme is to reduce child labor, a general equilibrium effect might, in principle, determine an increase in the demand for female work, with a consequential increase in wages. Neither Angelucci and De Giorgi (2006) nor Skoufias and Di Maro (2006) find any evidence in this direction. Last, non-eligible women might learn about cervical cancer not from their peers but by attending the health talks we discussed earlier in the paper. Lack of information about attendance at these events does not allow us to quantify this potential bias.

Our results are robust to a variety of robustness checks. First, we use the variation in the screening rate for high blood pressure among the eligibles as an alternative instrument for $\overline{Q}_{gj}$. This is a direct measure of screening service utilization and has the advantage that is not affected by the social norm. The results are perfectly in line with those described above. Second, we address the concern that our results might be driven by how our peer group is defined. Table A.3 in appendix A presents estimates of the eq. 1.15 using as the relevant peer group all households where the eldest child is within a 2 year range difference. While marginal effects are estimated less precisely, the main conclusions do not change.

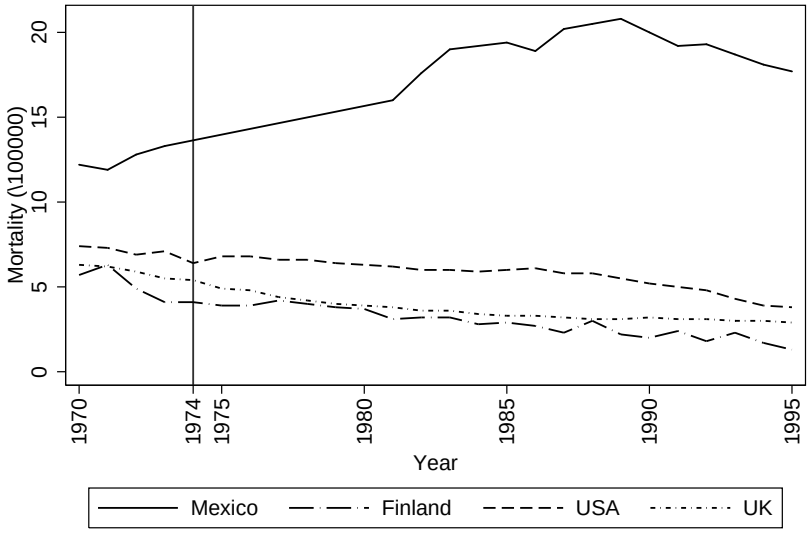
§1.6. Conclusions

In this paper we presented evidence from the PROGRESA social assistance programme on whether including cervical cancer screening among the conditions for receipt of cash transfers affects the screening decisions of women living in non-eligible households. Our main finding is that PROGRESA has a positive indirect effect on the demand for cervical cancer screening, but not on non-female specific health outcomes. Our results suggest that PROGRESA affects the screening decision of non-eligible women through two channels. First, PROGRESA weakens the social norm related to the opposition of household males to women being screened by male doctors. By exogenously increasing the proportion of eligible women who are required to be screened in order to meet the programme's requirements, PROGRESA increases the social acceptability of the PAP screening test. Our results suggest that this channel is quantitatively important for male headed households and households headed by more conservative females. Second, the programme generates an information spillover from eligible to non-eligible households, which mainly benefits women living in female headed households who are less well-informed and more at risk of contracting the disease.

There are three policy implications from our findings that could apply both

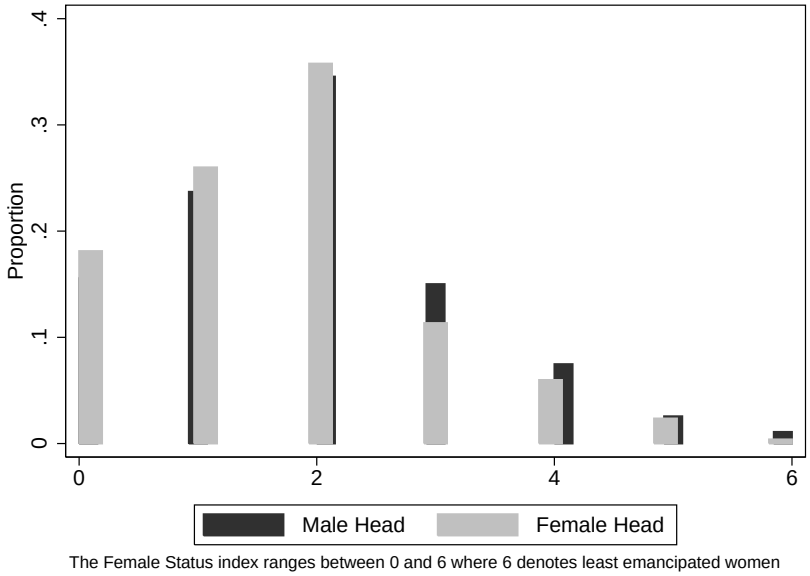
to developing and developed countries. First, the design and evaluation of national screening programme should explicitly take account of potential externalities from eligible to non-eligible households. Evaluation of a programme's benefits might change substantially if externalities are considered. Second, cultural barriers should be addressed explicitly if the programme is to be effective. Increasing the proportion of female health professionals in areas with a high proportion of ethnic and religious minorities for many women might act as a strong incentive for systematic screening. Third, information plays a crucial role in cancer prevention. Our results show that information received from peers might be as important as the information received from health professionals.

Figure 1.1: Cervical cancer mortality in selected OECD countries



The vertical line shows the start of the CCSP in Mexico. Age adjusted standardized rate
Source: OECD Health Data 2006

Figure 1.2: Proportion of Male and Female headed households by *FS* Index



The Female Status index ranges between 0 and 6 where 6 denotes least emancipated women

Table 1.1: Cervical Cancer Screening in selected OECD countries in Year 2002

Country	Participation (%)
Belgium	61.0
Canada	74.9*
Finland	71.8
France	74.9*
Germany	55.9
Iceland	74.0
Mexico	38.9
Netherlands	66.3
New Zealand	72.7
Sweden	72.0
United States	84.8**

Note: * refers to year 2003, ** refers to year 2001. The table reports the percentage of female population age 20-69 that got screened in the last 3 years.

Table 1.2: Descriptive evidence on screening rates

Mean, standard error in parenthesis clustered by village

	Eligible			Non-eligible		
Village Status	**Treatment**	**Control**	**DIFF**	**Treatment**	**Control**	**DIFF**
Cervical Cancer						
Mar 98 (1)	0.256	0.275	-0.018	0.319	0.354	-0.035
	(0.437)	(0.446)	(0.021)	(0.466)	(0.478)	(0.021)
Oct 98	0.361	0.219	0.142***	0.263	0.246	0.017
	(0.480)	(0.414)	(0.021)	(0.440)	(0.431)	(0.016)
May 99	0.391	0.246	0.144***	0.288	0.310	-0.022
	(0.488)	(0.431)	(0.018)	(0.453)	(0.463)	(0.022)
Oct 98-May 99 (2)	0.577	0.382	0.195***	0.462	0.434	0.028
	(0.494)	(0.486)	(0.024)	(0.499)	(0.496)	(0.020)
Difference (2)-(1)	0.320***	0.108***	0.213***	0.144***	0.080***	0.063**
	(0.008)	(0.010)	(0.022)	(0.009)	(0.011)	(0.020)
Sugar Blood						
Mar 98 (1)	0.251	0.251	-0.000	0.307	0.299	0.008
	(0.434)	(0.434)	(0.019)	(0.461)	(0.458)	(0.020)
Oct 98	0.402	0.251	0.150***	0.337	0.319	0.018
	(0.490)	(0.434)	(0.021)	(0.473)	(0.466)	(0.019)
May 99	0.410	0.275	0.134***	0.335	0.353	-0.018
	(0.492)	(0.447)	(0.020)	(0.472)	(0.478)	(0.022)
Oct 98-May 99 (2)	0.620	0.416	0.204***	0.540	0.522	0.018
	(0.485)	(0.493)	(0.024)	(0.498)	(0.500)	(0.020)
Difference (2)-(1)	0.369***	0.165***	0.204***	0.233***	0.223***	0.010
	(0.008)	(0.010)	(0.023)	(0.009)	(0.011)	(0.018)
Blood Pressure						
Mar 98 (1)	0.392	0.382	0.010	0.456	0.456	0.001
	(0.488)	(0.486)	(0.022)	(0.498)	(0.498)	(0.020)
Oct 98	0.521	0.334	0.187***	0.449	0.428	0.021
	(0.500)	(0.472)	(0.023)	(0.497)	(0.495)	(0.020)
May 99	0.526	0.368	0.158***	0.455	0.450	0.005
	(0.499)	(0.482)	(0.021)	(0.498)	(0.498)	(0.023)
Oct 98-May 99 (2)	0.747	0.541	0.206***	0.673	0.645	0.028
	(0.435)	(0.498)	(0.024)	(0.469)	(0.479)	(0.020)
Difference (2)-(1)	0.355***	0.159***	0.196***	0.217***	0.189***	0.028
	(0.008)	(0.011)	(0.022)	(0.009)	(0.011)	(0.018)

Note: *** denotes significance at 1%, ** at 5% and * at 10%. The sample includes both male and female headed households. The screening indicator takes value 1 if at least one household member has been screened. In March 1998 the question refers to the previous 12 months. In October 1998 and May 1999 to the previous six months. Oct 98-May 99 is the cumulative probability. Standard errors on the differences are derived from an OLS regression, estimated on eligible and non-eligible separately.

Table 1.3: Descriptive evidence on health supply

Proportion of villages covered by type of providers

	October 97			October 98		
Village Status	**Treatment**	**Control**	**DIFF**	**Treatment**	**Control**	**DIFF**
SSA clinic	0.079	0.130	-0.051*	0.097	0.108	-0.010
	(0.271)	(0.338)	(0.028)	(0.297)	(0.311)	(0.028)
IMSS Solid.	0.038	0.043	-0.006	0.028	0.022	0.007
	(0.191)	(0.204)	(0.018)	(0.166)	(0.145)	(0.015)
IMSS	0.003	0.000	0.003	0.003	0.011	-0.008
	(0.056)	(0.000)	(0.004)	(0.056)	(0.103)	(0.007)
Private Doctor	0.000	0.000	-	0.006	0.022	-0.015
	(0.000)	(0.000)	-	(0.079)	(0.145)	(0.010)
Health Aid	0.571	0.641	-0.070	0.633	0.602	0.031
	(0.496)	(0.481)	(0.045)	(0.483)	(0.491)	(0.045)
Mobile Unit	0.769	0.712	0.057	0.809	0.801	0.008
	(0.422)	(0.454)	(0.040)	(0.394)	(0.400)	(0.037)
Any of the providers	0.915	0.914	0.001	0.944	0.941	0.003
	(0.279)	(0.281)	(0.026)	(0.231)	(0.237)	(0.021)

Health indicators by village

	March 98			October 98		
	Treatment	**Control**	**DIFF**	**Treatment**	**Control**	**DIFF**
Services available	2.358	2.454	-0.096	3.131	3.065	0.067
	(1.964)	(2.043)	(0.184)	(2.273)	(2.241)	(0.209)
Opening days	5.567	5.512	0.055	5.285	5.349	-0.064
	(0.783)	(0.705)	(0.070)	(0.832)	(0.784)	(0.075)
Opening hours	10.403	10.119	0.284	9.225	9.232	-0.006
	(3.019)	(2.829)	(0.272)	(2.144)	(2.493)	(0.210)
Waiting time	55.871	58.139	-2.268	56.048	58.477	-2.429
	(23.494)	(24.230)	(2.195)	(19.813)	(19.090)	(1.804)
Visit duration	19.151	19.775	-0.623**	19.134	19.157	-0.022
	(3.169)	(3.067)	(0.289)	(3.304)	(3.357)	(0.307)
Visit fee	11.057	11.988	-0.930	5.475	9.769	-4.294***
	(10.021)	(10.166)	(0.931)	(7.035)	(10.730)	(0.792)

Note: *** denotes significance at 1%, ** at 5% and * at 10%. The number of main services available is obtained from a list of 7 services in the locality questionnaire. The remaining indicators are averages of the individual responses. Visit durations and waiting times are expressed in minutes. Consultation fees are expressed in pesos at October 1997 values. Standard errors on the differences are derived by an OLS regression.

Table 1.4: PROGRESA and the demand for health, DD for non-eligibles

Marginal effects from probit estimations, standard errors are clustered by village

	Cerv. Cancer screening	Blood Sugar screening	Blood Pressure screening	Health Centre visit
98o	0.125***	0.210***	0.188***	-0.051***
	(0.011)	(0.010)	(0.010)	(0.010)
T	0.001	0.028	0.028	0.008
	(0.015)	(0.015)	(0.014)	(0.011)
T*98o	0.055***	0.000	0.010	-0.007
	(0.021)	(0.019)	(0.019)	(0.019)
log wait. time	0.079***	0.052**	0.028	-0.016
	(0.023)	(0.023)	(0.022)	(0.016)
SSA clinic	0.045**	0.039*	0.019	-0.006
	(0.024)	(0.022)	(0.021)	(0.014)
IMSS Sol. clinic	0.065	0.159***	0.138***	0.093***
	(0.043)	(0.038)	(0.035)	(0.030)
IMSS clinic	-0.099**	-0.007	-0.059	0.006
	(0.051)	(0.058)	(0.050)	(0.025)
Private doctor	-0.043	-0.009	-0.071***	0.001
	(0.050)	(0.027)	(0.027)	(0.017)
Medical aid	0.033**	0.031**	0.048***	0.016
	(0.015)	(0.015)	(0.014)	(0.011)
Mobile unit	0.009	0.011	0.001	-0.009
	(0.017)	(0.016)	(0.016)	(0.012)
Observations	17615	19056	19204	19998

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. Standard errors are derived using the delta method. The health centre visit takes the value 1 if at least one household member visited a health centre in the previous six months. The screening tests refer to the previous 12 months. All specifications control for the gender, age and its square, and literacy status of the household head, and whether (s)he speaks the indigenous language. They also include controls for the household poverty index, the household size, number of children, whether there is a woman in the age group 25-64, percentage of women above 18 with secondary school education, percentage of eligibles in the village, total number of households in the village and state fixed effects. The excluded category among the health providers is either no doctor or a "traditional" doctor (herbalist).

Table 1.5: PROGRESA and the demand for health, DD for eligibles

Marginal effects from probit estimations, standard errors are clustered by village

	Cerv. Cancer screening	Blood Sugar screening	Blood Pressure screening	Health Centre visit
98o	0.266***	0.326***	0.314***	0.022***
	(0.012)	(0.013)	(0.012)	(0.010)
T	0.082***	0.111***	0.116***	0.106***
	(0.016)	(0.016)	(0.015)	(0.012)
T*98o	0.216***	0.206***	0.203***	0.163***
	(0.023)	(0.023)	(0.023)	(0.020)
log wait. time	0.070***	0.082***	0.053**	0.006
	(0.025)	(0.026)	(0.025)	(0.018)
SSA clinic	0.092***	0.065***	0.024	0.043***
	(0.030)	(0.027)	(0.025)	(0.016)
IMSS Sol. clinic	0.173***	0.200***	0.144***	0.087***
	(0.045)	(0.048)	(0.047)	(0.022)
IMSS clinic	-0.060	0.044	0.050	0.101***
	(0.106)	(0.124)	(0.058)	(0.018)
Private doctor	0.016	-0.007	-0.038	-0.050
	(0.088)	(0.047)	(0.063)	(0.066)
Medical aid	0.032**	0.042***	0.054***	0.025**
	(0.017)	(0.016)	(0.016)	(0.013)
Mobile unit	0.017	-0.003	-0.010	-0.028**
	(0.019)	(0.021)	(0.019)	(0.012)
Observations	20124	21130	21216	21955

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. Standard errors are derived using the delta method. The health centre visit takes the value 1 if at least one household member visited a health centre in the previous six months. The screening tests refer to the previous 12 months. All specifications control for the gender, age and its square, literacy status, whether (s)he speaks the indigenous language of the head of household, the household poverty index, household size, number of children, whether there is any woman in the age group 25-64 and the percentage of women above 18 with secondary school education, the percentage of eligibles in the village, the total number of households in the village and state fixed effects. The excluded category among the health providers is either no doctor or a "traditional" doctor (herbalist).

Table 1.6: IV Estimates, DD

Marginal effects from ivprobit estimations,
bootstrapped standard errors are clustered by village

Non-Eligibles

	Cerv. Cancer screening	Blood Sugar screening	Blood Pressure screening	Health Centre visit
98o	-0.017	0.028	0.023	0.022
	(0.029)	(0.037)	(0.035)	(0.022)
T	0.136***	0.211***	0.191***	-0.060***
	(0.019)	(0.030)	(0.023)	(0.016)
T*98o	0.056**	0.001	0.012	-0.009
	(0.028)	(0.034)	(0.032)	(0.030)
log wait time	-0.263	0.029	-0.078	0.268
	(0.437)	(0.828)	(0.584)	(0.319)
Observations	17615	19056	19204	19998

Eligibles

	Cerv. Cancer screening	Blood Sugar screening	Blood Pressure screening	Health Centre visit
98o	0.083***	0.114***	0.116***	0.106***
	(0.019)	(0.018)	(0.016)	(0.014)
T	0.267***	0.327***	0.314***	0.022**
	(0.015)	(0.015)	(0.014)	(0.011)
T*98o	0.218***	0.212***	0.202***	0.162***
	(0.028)	(0.027)	(0.024)	(0.022)
log wait time	-0.016	-0.137	0.105	0.043
	(0.258)	(0.222)	(0.210)	(0.197)
Observations	20124	21130	21216	21955

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. The log waiting time is instrumented using the average opening days per week of the health centres in the village. The IV probit is calculated using a two stage procedures based on the control function approach. Marginal effects are calculated as average partial effects. Standard errors are calculated with 200 bootstrap repetitions and are adjusted for clustering at village level. All specifications also control for all the variables included in the regressions presented in table 1.4.

Table 1.7: The effect PROGRESA on health expenditure, DD estimator

OLS regresions, standard errors are clustered by village

Non-eligibles

	Drugs Expenditure	Visits Expenditure
98o	-25.899***	-8.156***
	(2.645)	(1.162)
T	0.356	2.144
	(3.052)	(1.396)
T*98o	-0.323	-0.964
	(3.339)	(1.611)
Observations	20015	20044

Eligibles

	Drugs Expenditure	Visits Expenditure
98o	-20.947***	-5.640***
	(2.362)	(0.971)
T	-1.451	-0.070
	(2.650)	(1.108)
T*98o	-1.267	-2.060*
	(2.850)	(1.183)
Observations	22097	22119

Note: *** denotes significance at 1%, ** at 5% and * at 10%. The amounts are expressed in *pesos* at October 1997 values. All specifications also control for the variables included in the regressions presented in table 1.4.

Table 1.8: Prenatal care outcomes, DD

First column: OLS
Second column: Marginal effects from probit estimations

Non-eligibles

	Pregnancy checks	Tetanus vaccination
98o	-0.462*	0.021
	(0.241)	(0.055)
T	0.015	0.078
	(0.218)	(0.051)
T*98o	-0.057	-0.097
	(0.291)	(0.073)
Observations	709	706

Eligibles

	Pregnancy checks	Tetanus vaccination
98o	-0.729***	-0.031
	(0.253)	(0.052)
T	-0.228	0.015
	(0.214)	(0.043)
T*98o	0.016	0.072
	(0.312)	(0.057)
Observations	1121	1108

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects of probit estimates are calculated as average partial effects. Standard errors are derived using the delta method and are adjusted for clustering at village level. All specifications also control for the variables included in the regressions presented in table 1.4

Table 1.9: Screening behaviour in control villages

Marginal effects from probit estimations, standard errors are clustered by village

	All		Eligibles		Non-Eligibles	
Cervical cancer						
98o	0.119***	0.105***	0.133***	0.118***	0.094***	0.083***
	(0.013)	(0.014)	(0.016)	(0.017)	(0.016)	(0.016)
Distance from SSA (km)		-0.001**		-0.001**		-0.001**
		(0.000)		(0.000)		(0.000)
Number of services		0.011**		0.012**		0.008
		(0.005)		(0.005)		(0.006)
Observations	14505	14485	7493	7474	7012	7011
Blood sugar						
98o	0.218***	0.208***	0.206***	0.196***	0.220***	0.211***
	(0.013)	(0.013)	(0.018)	(0.019)	(0.015)	(0.015)
Distance from SSA (km)		-0.000		-0.000		-0.000
		(0.000)		(0.000)		(0.000)
Number of services		0.011***		0.014***		0.008*
		(0.004)		(0.004)		(0.004)
Observations	15515	15494	7906	7886	7609	7608
Blood pressure						
98o	0.201***	0.196***	0.198***	0.197***	0.186***	0.179***
	(0.013)	(0.014)	(0.018)	(0.019)	(0.014)	(0.015)
Distance from SSA (km)		-0.000		-0.000		-0.000*
		(0.000)		(0.000)		(0.000)
Number of services		0.010**		0.010**		0.008*
		(0.004)		(0.005)		(0.005)
Observations	15591	15570	7929	7909	7662	7661

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. Distance from SSA is defined as the distance from the closest village with a SSA hospital. Number of services ranges between 0 and 7 as described in the locality questionnaire. All specifications also control for all the variables included in the regressions presented in table 1.4

Table 1.10: Screening behaviour by gender of the head of household, DD for non-eligibles

Marginal effects from probit estimations, standard errors are clustered by village

	Cerv. Cancer screening			Blood Pressure screening			Blood Sugar screening		
	Full Sample	Male Head	Female Head	Full Sample	Male Head	Female Head	Full Sample	Male Head	Female Head
98o	0.120***	0.118***	0.143***	0.184***	0.184***	0.183***	0.207***	0.210***	0.191***
	(0.011)	(0.011)	(0.020)	(0.009)	(0.010)	(0.020)	(0.010)	(0.010)	(0.020)
T	0.002	0.004	-0.017	0.030**	0.027*	0.045*	0.030**	0.028*	0.042*
	(0.015)	(0.016)	(0.025)	(0.014)	(0.014)	(0.025)	(0.015)	(0.015)	(0.024)
T*98o	0.054**	0.050**	0.088**	0.010	0.011	0.003	-0.000	-0.000	-0.001
	(0.021)	(0.021)	(0.037)	(0.019)	(0.020)	(0.038)	(0.019)	(0.020)	(0.037)
Female head	-0.052***			0.012***			-0.015***		
	(0.000)			(0.000)			(0.000)		
T*98o*Female head	0.016			0.011			-0.009		
	(0.029)			(0.025)			(0.028)		
Observations	17615	15446	2169	19204	16690	2514	19056	16571	2485

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. Standard errors are derived using the delta method. All specifications also control for all the variables included in the regressions presented in table 1.4

Table 1.11: Cancer related characteristics by gender of the head of household

Household Characteristics

	Female Head	Male Head	DIFF
Age head	59.310	50.300	9.010***
	(14.772)	(15.900)	(0.424)
Literate head	0.444	0.738	-0.294***
	(0.497)	(0.440)	(0.012)
Indigenous head	0.241	0.255	-0.013
	(0.428)	(0.436)	(0.012)
Marginality Index	844.514	843.618	0.895
	(100.359)	(110.248)	(2.928)
Proportion women age 25-64	0.342	0.238	0.104***
	(0.315)	(0.158)	(0.005)
Proportion women above 18 with sec. school	0.072	0.131	-0.059***
	(0.210)	(0.297)	(0.008)
Observations	1588	9142	

Sex related behaviour of female respondent

	Female Head	Male Head	DIFF
Pregnancies	5.484	5.006	0.478***
	(4.070)	(3.467)	(0.121)
Never used contraception	0.595	0.508	0.086***
	(0.491)	(0.500)	(0.015)
Never PAP test	0.562	0.556	0.006
	(0.496)	(0.497)	(0.015)
Observations	1053	7331	

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Differences are computed by running an OLS regression. Statistics are calculated only on the sample of non-eligible households. Household characteristics were collected in October 1997. The information about the sexual behaviour of female respondent was collected in March 1998

Table 1.12: Sex behaviour and female status in the sample of non-eligibles

Linear probability model

	Female Head		Male Head	
	Never PAP test	Never contraception	Never PAP test	Never contraception
Age head	-0.005***	-0.005***	-0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Literate head	-0.045	-0.018	-0.010	-0.033*
	(0.029)	(0.029)	(0.014)	(0.014)
Poverty Index	-0.001***	-0.000*	-0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
FS index	0.010	0.002	0.021***	0.015***
	(0.011)	(0.011)	(0.004)	(0.004)
Age wife			-0.005***	0.001
			(0.001)	(0.001)
Literate wife			-0.100***	-0.085***
			(0.013)	(0.013)
Constant	1.323***	1.117***	1.163***	0.599***
	(0.103)	(0.103)	(0.036)	(0.037)
Observations	1261	1261	8539	8539

Note: *** denotes significance at 1%, ** at 5% and * at 10%. The variable Never PAP test takes the value 1 if the female respondent has never had a PAP test. The variable Never contraception takes the value 1 if she has never used any form of contraception . The *FS* index ranges between 0 and 6 where 6 denotes least emancipated women. All the variables above were created using information elicited in March 1998

Table 1.13: Intensity of the indirect treatment effect on cervical cancer screening, DD

Marginal effects from probit estimations,
standard errors are clustered by village

	Full sample	Male Head	Female Head
98o	0.121***	0.119***	0.143***
	(0.011)	(0.011)	(0.020)
T	0.002	0.004	-0.017**
	(0.015)	(0.016)	(0.025)
T*98o	0.053***	0.048**	0.088***
	(0.021)	(0.021)	(0.037)
Ratio Eligibles	-0.150***	-0.153***	-0.112***
	(0.010)	(0.011)	(0.013)
T*98o*Ratio Eligibles	0.140***	0.160***	0.005
	(0.050)	(0.057)	(0.075)
Observations	17615	15446	2169

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. Standard errors are derived using the delta method. *Ratio Eligibles* is the proportion of eligibles in each village. All specifications control for all the variables included in the regressions presented in table 1.4

Table 1.14: Intensity of the ITE on cervical cancer screening by level of female emancipation, DD

Marginal effects from probit estimations,
standard errors are clustered by village

	High	*Medium*	*Low*
98o	0.088***	0.125***	0.178***
	(0.018)	(0.016)	(0.020)
T	-0.026**	0.047*	-0.025
	(0.023)	(0.025)	(0.031)
T*98o	0.080**	0.037	0.029
	(0.034)	(0.034)	(0.037)
Ratio Eligibles	-0.128***	-0.031***	-0.244***
	(0.012)	(0.006)	(0.031)
T*98o*Ratio Eligibles	0.090	0.107	0.142**
	(0.091)	(0.094)	(0.067)
Observations	7318	6013	4284

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. Standard errors are derived using the delta method. The sample is split according to the terciles of the village average of the *FS* index as measured in March 1998. All specifications also control for the variables included in the regressions presented in table 1.4

Table 1.15: Indirect treatment effect on cancer screening by characteristics of the head of household

Marginal effects from probit estimations, standard errors are clustered by village

	Male Head	Female Head	Male Head	Female Head	Male Head	Female Head
98o	0.118***	0.142***	0.118***	0.143***	0.118***	0.142***
	(0.011)	(0.020)	(0.011)	(0.020)	(0.011)	(0.020)
T	0.004	-0.018	0.004	-0.016	0.004	-0.017
	(0.016)	(0.025)	(0.016)	(0.025)	(0.016)	(0.025)
T*98o	0.048**	0.089***	0.048**	0.088***	0.049**	0.086***
	(0.021)	(0.037)	(0.021)	(0.037)	(0.021)	(0.037)
Indigenous Head	-0.064***	-0.027***				
	(0.001)	(0.001)				
T*98o*Indigenous Head	0.078**	-0.023				
	(0.031)	(0.059)				
Head Above 60			-0.048***	-0.051***		
			(0.000)	(0.001)		
T*98o*Head Above 60			0.041*	-0.005		
			(0.026)	(0.044)		
Illiterate Head					-0.034***	-0.037**
					(0.000)	(0.001)
T*98o*Illiterate Head					0.063***	0.059*
					(0.026)	(0.042)
Observations	15446	2169	15446	2169	15447	2171

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. Standard errors are derived using the delta method. Indigenous head takes the value1 if the head speaks the indigenous language. Head above 60 takes the value 1 if the household head is aged 60 or above. All specifications also control for the variables included in the regressions presented in table 1.4.

Table 1.16: Indirect treatment effect on cancer screening and status of the female head

Marginal effects from probit estimations, standard errors are clustered by village

	Widow	Non-widow
98o	0.149**	0.129
	(0.024)	(0.035)
T	-0.026**	-0.007
	(0.026)	(0.046)
T*98o	0.094**	0.074
	(0.045)	(0.065)
Observations	1447	702

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. Standard errors are derived using the delta method. All specifications also control for all the variables included in the regressions presented in table 1.4.

Table 1.17: Learning in cervical cancer screening: Effect of initial information

Marginal effects from ivprobit estimations, bootstrapped standard errors are clustered by village

	Full Sample	Male Head	Female Head
Peer group screening rate	0.492***	0.514***	0.447
	(0.144)	(0.157)	(0.398)
No contraception	-0.108***	-0.111***	-0.077
	(0.014)	(0.014)	(0.056)
Peer group screening rate*no contraception	0.153*	0.104	0.570**
	(0.093)	(0.104)	(0.285)
Observations	6931	6313	618
Cragg Donald Test	30.163	25.763	4.232
Cragg Donald χ^2	121.213	103.560	17.821

Note: *** denotes significance at 1%, ** at 5% and * at 10%. The peer group is defined by all the village households whose eldest children are in the same school grade. The level of initial information is proxied by the dummy for having never used any method of contraception, as recorded in March 1998. The IV strategy exploits the the treatment effect, the average number of payments received by the eligibles in the peer group and their interaction as instrument. The IV probit is calculated using a two stage procedure based on the control function approach. Marginal effects are calculated as average partial effects. Standard errors are calculated with 200 bootstrap repetitions and are adjusted for clustering at village level. The Cragg Donald test for the validity of the rank condition is reported. All specifications also control for the variables included in the regressions presented in table 1.4.

CHAPTER 2

Does Healthcare Promotion Matter in Poor Countries? Evidence from a Randomized Experiment

We present evidence on how the attendance of health and nutrition sessions affects the health behaviour of adults living in households targeted by a conditional transfer programme in rural Mexico. The evaluation sample of the *Programa de Apoyo Alimentario* (PAL) is unique in having four different treatment types, which are randomly assigned to four different groups of localities, with one group designated to receive transfers but without any requirement to attend health and nutrition courses. We find that attendance at educational courses does not affect drinking and smoking behaviour, but significantly reduces the probability of having a large waist circumference among women. We provide evidence that receiving health and nutrition information determines a large drop in the probability that adult women have excessive calorie intake. The results suggest that lack of information can explain, at least in part, the impressive rise in female obesity in developing countries.

§2.1. Introduction

Drawing on the experience of PROGRESA,[1] conditional cash transfer (CCT) programmes have been introduced widely in many developing countries and careful evaluations show that they have been extremely effective in improving the well being of poor households.[2] However, there is limited evidence on how individual CCT components contribute to the combined effect.[3] In this paper we exploit

[1] This national programme started in 1997. In its first three years its benefits were extended to approximately 2.6 m families, which is about 40% of all Mexican families. Under the Fox Administration the programme was renamed *Oportunidades*.

[2] Among others, see Skoufias (2005) for a review of the impact of PROGRESA on a variety of welfare indicators. Attanasio and Mesnard (2006) document on the effect of *Familias en Accion* on household consumption in Colombia.

[3] Paxson and Schady (2007) find that an unconditional cash transfer programme implemented in Ecuador had a positive and beneficial effect on the physical, cognitive and socio-emotional

the unique evaluation design of the *Programa de Apoyo Alimentario* (PAL) nutritional programme implemented in rural Mexico, to study the effect of health and nutrition courses on the prevalence of health risk factors, i.e. smoking, heavy drinking and obesity, among adults.

In order to receive the transfer, household members have to engage in a set of activities, including prenatal care, well-baby care and immunization, nutrition monitoring and supplementation, preventive checkups and participation in educational sessions covering health and nutrition topics. *A priori* there are strong arguments in favour of making transfers conditional. Conditionalities, among other reasons, could help to screen for families that are in less need and might help governments to overcome information asymmetries about the benefits of immunization and screening programmes. However, some have stressed that such programmes can have disadvantages (see de Brauw and Hoddinott (2008) for a summary). First, it has been documented that they contribute to significantly increased administration costs. Caldes et al. (2006) show that monitoring conditionalities represents approximately 18% of PROGRESA's administrative costs and 2% of total programme costs. Second, the opportunity costs for households to fulfil these conditionalities may be very high and, as noted by Molyneux (2006), these costs will not necessarily be shared equally among household members. In fact, the burden of taking children to health clinics or attending informational courses falls primarily on mothers. Third, some households may find the conditions too difficult to meet: if these households are among the poorest households, imposing conditions might affect compliance by those who are actually the primary targets of the programme. If the actual or perceived benefits of conditionalities do not outweigh the additional costs, imposing conditions on the receipt of transfers may not be worthwhile.

There is well established evidence that documents the positive effect of CCT programmes on health outcomes.[4] However, the evaluation designs implemented so far do not allow researchers to distinguish to what extent improvements in health related indicators are due to increases in available resources and and to what extent are due to the behavioural requirements. Moreover, since most of

development of children. de Brauw and Hoddinott (2008) exploit the fact that some PROGRESA beneficiaries who received transfers did not receive the forms needed to monitor their children's attendance at school, to test how the conditionality affects school enrolment and attendance.

[4]Gertler and Boyce (2003) finds that PROGRESA determined significant improvements in child as well as adult health, as measured by a reduction in the number of days of difficulty in conducting daily activities and in the number of days in bed due to illness. Gertler (2004) provides evidence on the effect of PROGRESA on child health including morbidity, height and anemia. Lagarde et al. (2007) provides a recent review on the effect of six CCT programmes on health outcomes in Latin America and Africa.

these programmes target women as transfer recipients, part of the combined effect of CCTs on health outcomes might be related to the increased bargaining power of women in the household. Attanasio and Lechene (2002) shows that as the share of household income brought by the wife increases, expenditure on tobacco and alcohol falls, while the expenditure on child clothing increases.[5]

In this paper we investigate how attendance at health and nutrition sessions, as one of the conditionalities for receiving a transfer, affects the health related behaviour of adults in beneficiary households as measured by their propensity to smoke, drink to excess and become obese. It is crucial to disentangle the effects of information from the increased resources due to the programme on these outcomes. On the one hand, higher income allows individuals better access to health inputs (e.g. medical care and food). On the other hand, people with greater resources can buy more goods, including cigarettes, alcohol and unhealthy food. Ruhm (2000, 2005) finds that recessions improve adult health, arguing that individuals engage in healthier lifestyles during downturns - they take more exercise, and drink and smoke less. Moreover, income might also be correlated with a third factor, i.e. education, which is positively correlated with good health.[6] Traditionally, undernourishment and infectious diseases have been the main health related burdens in developing countries. However, many of these countries are witnessing dramatic increases in the incidence of obesity (Popkin (2001)) and its related morbid and comorbid conditions. Fernald et al. (2004) using the 2000 National Health Survey find that in Mexico the combined prevalence of being overweight and being obese is nearly 60% in women and more than 50% in men.[7]

The PAL is a nutritional programme that operates in very poor rural localities in Mexico. According to its initial design, the four different treatment types in the evaluation sample are assigned randomly across localities based on following criteria: 50 localities selected as control localities; 51 localities receive the transfer in kind; 52 localities receive the transfer in kind conditional on nutrition and health education; 53 localities are entitled to cash benefits conditional on nutrition and health education.[8] The educational component is delivered, through organized

[5]Rubalcava et al. (2009), drawing on direct measures of inter-temporal preferences collected in the Mexican Family Life Survey (MxFLS), suggest that women have longer planning horizons.

[6]While the causal effect of income on health status in adult age is still debated, there is compelling evidence on the effect of parental income on child health (see, e.g., Case et al. (2002) and Currie and Stabile (2003)). Cutler and Lleras-Muney (2008) provides an exhaustive review of the relationship between education and health.

[7]Case and Menendez (2007) reports that in 138 out of 194 countries for which WHO obesity statistics are available women are more than 50% more likely to be obese than men.

[8]Skoufias et al. (2008) find that the programme determines a large increase on food and total consumption and a significant reduction of poverty, irrespective of whether the transfer is

sessions, by local organizers who receive appropriate training.[9]

In order to identify the effect of the information received as a result of the programme, we first restrict our analysis to only two of the four groups of localities included in the evaluation sample: the group for which transfer in kind is conditional on attending health and nutrition sessions and the group for which transfer in kind is not subject to this requirement. These two groups were supposed to receive identical treatment except for the educational component. We exploit variations in the intention-to-treat (ITT) and in the average distance to the PAL centre in the locality to address potential endogeneity of the decision to attend health and nutrition sessions.

Our results show that providing health and nutrition information as part of the programme has no significant effect on the probability of smoking and heavy drinking. We find also that the educational requirement strongly reduces the probability of a large waist circumference among women. Exploiting unique information on individual energy intake, we show that attending classes that cover health and nutrition topics leads to a large and significant drop in the probability that an adult woman has an excessive calorie intake: a 10 percentage point increase in the probability of attending a nutrition related session reduces the probability that the daily calorie intake exceeds the one recommended by nutritional guidelines, by 3.3 percentage points.

This work contributes to two strands of the literature. First, it provides some guidelines for the design of CCTs. As Gertler (2004) emphasizes, a better understanding of how the different components of a programme contribute to their overall effect would improve their cost-effectiveness. Second, we provide experimental evidence about the role of health information as an important determinant of health behaviour, which should give greater scope to specific public policies addressed to improving health related knowledge. The paper is organized as follows. Section 2.2 provides details on PAL and its evaluation design. Section 2.3 discusses our empirical strategy. The results are presented in Section 2.4 and Section 2.5 concludes.

in cash or in-kind.

[9]Since sessions on organizational and logistical aspects are compulsory for the three treatment groups, from hereon in referring to the obligation to attend sessions that cover health and nutrition topics this refers to the education component.

§2.2. PAL: programme description and evaluation design

The PAL is an intervention aimed at reducing poverty and improving the nutritional status of target households, which are in rural localities of Mexico not covered by PROGRESA or *Liconsa*. The programme rules do not specify that it is the woman in the household who will be the recipient of the food transfer, although, in practice, more than 75% of beneficiaries are women (Skoufias et al. (2008)). PAL operates in small (population less than 2,500) localities, which are very marginalized (according to the National Council for Population (CONAPO) criteria), are accessible (not more than 2.5 km from a road) and close enough (not more than 2.5 km) to a DICONSA store, because food distribution was implemented by DICONSA.[10] The programme also includes a household level criterion. The household level criterion was not applied to the localities in the evaluation sample, making all households in the 'treated localities' potentially eligible for the programme.

PAL provides in-kind transfers (food baskets) to most of the 150,000 target households. However, an alternative cash transfer was available for communities that DICONSA did not reach regularly. Approximately 5% of PAL beneficiaries receive cash as opposed to in-kind goods. The value of both types of transfer is 150 Mexican pesos or about US$13 every month.[11] The benefits that are distributed through DICONSA to rural poor communities consist of non-perishable foods and household goods. PAL includes classes (*platicas*) that cover health, nutrition and hygiene related topics, as well as participation in programme-related logistic activities. Local community leaders, chosen from among those with an adequate level of education and some basic knowledge of health and nutrition issues, are given specific training and are in charge of delivering the courses. While, in principle, the *platicas* are a requirement for receiving a transfer,[12] Skoufias et al. (2008) report that since the start of PAL no household has been denied benefits on the grounds of not attending educational courses. These courses are meant to help empower individuals by allowing them to acquire knowledge, habits, attitudes and practices that will encourage them to consume enough food to avoid or prevent nutritional problems, such as malnutrition, anaemia, vitamin A deficiency, diabetes, obesity and hypertension.[13]

[10] DICONSA is the Mexican government agency that manages the supply of food (through its stores) to rural poor localities. Prices on average are lower than in local stores.

[11] The mean share of transfer in pre-programme consumption is 11.5%.

[12] Households are supposed to be excluded from the programme if they miss more then two *platicas* in a row or four in one year.

[13] Among other things, beneficiaries receive a recipe book (with ingredients based on the food

The evaluation design is an experimental community trial and the data were collected on two occasions two years apart: at baseline in October 2003 through April 2004, and a follow up in October through December 2005.[14] The evaluation sample consists of 206 localities from 8 Mexican states (Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz and Yucatan). These localities were randomly assigned to a 'control' group (50 localities hereon referred to as `T1`) and three treatment groups: one assigned to receive 'in-kind transfer without education' (52 localities referred to as `T2`), 'in-kind transfer and education' (51 localities referred to as `T3`), and 'cash transfer and education' (53 localities referred to as `T4`). In each locality 33 households were chosen randomly for interviews. The original intention was to make monthly deliveries of the food baskets to beneficiary households; however, for logistical reasons delivery became two baskets every two months. The basic food basket contains: powdered fortified milk (8x240 gm packages), beans (2kg), rice (2kg), cornflour (3kg), soup pasta (6x200gm packets), vegetable oil (1lt), cookies (1kg), corn starch (100gm), powdered chocolate drink (400gm), ready-to-eat cereal (200gm), and sardines.[15] The basket represents approximately 400 calories per day for an average household of 4.2 equivalent adults.

We have information on 5,851 households for both waves. We have extensive information on household and individual level outcomes. In addition to the household food (based on 7 day recall) and non-food consumption module, individual nutritional intakes are available for all children aged under 5, and their mothers (based on 24 hour recall). Anthropometric measures and haemoglobin levels (only for the follow-up survey) are available for children under 5, women, and male adults above 30. Each household respondent is asked detailed questions about the number, content and timing of the *platicas* attended.

The original design of the evaluation sample was contaminated. While sessions on the logistics and the organization of the programme were included in each of the three treatment groups, sessions on health and nutrition topics should have been delivered only in localities `T3` and `T4`. However, health and nutrition topics were covered in localities `T2` as well. According to González-Cossío et al. (2006) and Skoufias et al. (2008), this was a spontaneous decision made by the local programme administrators. In spite that, in the next section I provide evidence

basket items) and posters showing the "Healthy Eating Dish" (*Plato del Bien Comer*). Every year, beneficiaries nutritional knowledge is tested.

[14]Further details about the sampling procedure can be found in Skoufias et al. (2008).

[15]This basket has been distributed between June and October 2004. After November 2004 cereals were replaced by dried meat (100gm) and corn starch by lentils (500gm).

that, consistent with the original design, programme recipients in localities T2 are significantly less likely to receive health and nutrition information.

§2.3. Empirical Analysis

2.3.1 — Descriptives

Table 2.1 presents descriptive baseline statistics for the four different types of localities (villages). Consistent with the randomized design of the evaluation sample, there are no significant differences in the main demographic characteristics across the four groups of localities. Around 80% of respondents were literate, though less than 30% had secondary level education or above.

All respondents aged 12 or above were asked whether or not they smoked, even occasionally. At baseline, the smoking rate in the age group 18-60 is 7.6% with dramatic differences between men (14.8%) and women (1%). The pattern was similar for the follow-up survey (see columns 4 to 6 in Table 2.2). WHO statistics report that tobacco consumption in Mexico dropped by more than 50% between 1970 and 2000. Franco-Marina (2007) using three waves of the ENA finds that the percentage of those that have never smoked increased by 26% between 1988 and 2002 for the sample of men aged 18-65 versus a 2% increase among women. Individuals were asked whether they drank alcohol, even occasionally, and the number of drinks they had consumed in the week before the interview. According to the WHO, a woman (man) should not exceed 1 (2) units of alcohol per day. We therefore classify as heavy drinkers those women (men) who consumed 7 (14) or more drinks the week before the interview. Both the baseline and the follow-up data show an extremely low percentage of heavy drinkers (3.6%), almost null for women (see columns 2 and 5 in Table 2.2). These results, while potentially biased by severe underreporting, are in line with those in the National Survey of Addictions (ENA) 2002, which reports that 0.27% (2.45%) of women (men) aged 18-65 living in rural areas drink daily or almost daily.

In the first wave, information on body mass index (BMI) was collected only for children, and women under 52. At baseline 25.8% of the women aged 18-51 have a BMI equal to or above 30 and are therefore classified as obese.[16] In the follow-up survey we measured the waist circumferences (WC) of women, and men aged 31 or over. Women (men) with a WC over 88 (102) cm are classified as obese. Medical evidence suggests that body fat distribution is a more important

[16] Using data from the Social Welfare Survey (2003), for a sample of low-income rural Mexicans, Fernald et al. (2004) find that 22.2% (13.6%) of adult women (men) have a BMI equal to or above 30.

determinant of disease risk than body mass.[17] Therefore, waist circumference is being accepted as a more sensitive measure of relative disease risk, especially among menopausal and post menopausal women.[18] 48.6% (17.2%) of the adult women (men) in the sample have a WC above 88 (102) cm. Although the two measures of obesity are not directly comparable, there are two implications from these findings. First, consistent with the results in Case and Menendez (2007) for South Africa, the prevalence of obesity is much higher among women than men. Second, measures based on BMI might severely underestimate the burden of obesity, especially for women.

At the baseline there are no significant differences in the propensity to smoke and drink heavily in the four groups, with a slightly higher number of smokers in the control localities. Table 2.3 shows an increase in the prevalence of smoking over time at a rate that is steeper in villages belonging to the group of localities supposed to receive the transfer in kind with no educational requirement. Drinking also increases over time and both `T2` and `T3` villages have 4.2% of heavy drinkers. There are no significant differences in the probability that the BMI is equal to or above 30 across the four groups at the baseline. In the follow-up the proportion of individuals with a large WC is on average lower in the group that were supposed to receive the food basket with health and nutrition sessions.

In order to separately identify the effect of the educational component we focus on the two groups of localities which, according to the original design, were supposed to receive the food basket without conditionalities, and those where beneficiaries are required to attend the health and nutrition sessions in order to receive the food basket. Since there is no information either on the number of courses attended or the distance from the PAL centre for 3 villages, we restrict our analysis to 100 villages. In the follow-up survey detailed information on the number of courses, the topics[19] and the date of the first course attended is available at household level. Table 2.4 shows that there are no significant differences between the two groups in take up of the programme and average number of baskets received.

[17] Individuals with a high proportion of abdominal fat have a greater risk of developing diabetes mellitus type 2, coronary artery and cardiovascular diseases. Among others, Yusuf et al. (2004), using data from the cross country study INTERHEART, find that the effect of the BMI on the risk of myocardial infarction becomes statistically not significant once the abdominal obesity (waist/hip ratio) is included among the controls of the multivariate regression.

[18] During the menopause there is an increase in abdominal adiposity that is countered by an accelerated loss of lean mass, such that body weight should not change significantly (see Van Pelt et al. (2001)).

[19] Respondents are asked to indicate up to 5 topics from the following: 1) organization of PAL, 2) nutrition, 3) health, 4) hygiene, 5) other topics.

The average number of classes attended by the beneficiary households in group T2 is not significantly different from that for group T3. Sessions that illustrate the organizational features of the programme (the type of benefit and the required criteria) were supposed to be taken in both groups of localities. Consistently, we did not detect any significant difference in the proportion of households that had attended at least one session on the organization of the programme. Due to contamination of the evaluation sample, households in group T2 exhibited a probability of attending health and nutrition related discussions significantly different from zero. However, beneficiaries in the group T3 are significantly more likely to attend sessions that cover health and nutrition topics.

Individuals are elicited only the month and the year of the first class attended and the time interval between the first course attended and the second interview varies between 5 and 23 months.

2.3.2 — Empirical Model

In order to estimate the effect of the health and nutrition information provided through PAL, we use the following specification:

$$Y_{ijk} = \beta_0 + \beta_1 Inf_{jk} + \beta_2' X_{ijk} + u_{ijk} \tag{2.1}$$

where Y_{ijk} is the health risk related behaviour of individual i in household j in locality k recorded in the follow-up survey. Inf_{jk} is the proxy for information received through the programme by household j in locality k. X_{ijk} is a full set of individual and household characteristics, including the number of food baskets received by the household, age, square of age, sex, a dummy for the household head status, marital status, dummies for educational attainments and ability to speak the indigenous language, a vector of dummies for asset holding (e.g. house, land) and dummies for the receipt of any additional welfare programme by household j. All regressions control for state fixed effects.

The parameter of interest is β_1, which measures the effect of the information provided by the programme on the propensity to smoke, drink heavily and be obese. We estimate the model in eq. 2.1 using two different proxies for information received via the programme (Inf_{jk}): a dummy for attendance at one or more health related sessions and a dummy for attendance at one or more nutrition related sessions. Although in the majority of cases courses are attended by women, we estimate the model in eq. 2.1, for adult males and females, with the purpose of assessing the existence of within household externalities. In particular, we test

whether the information acquired by women through the programme can affect the health related behaviour of their partners.

Two potential sources of endogeneity might affect the identification of the parameter β_1. Individual unobserved characteristics might be correlated with both attendance at the educational sessions and health behaviour. Moreover, both the number and the type of sessions attended might be misreported, either intentionally or unintentionally, by the respondents. In order to address the potential endogeneity issues, we take two steps. First, we restrict the sample to the two groups of localities that were supposed to receive the food basket (`T2` and `T3`). According to the original design these two groups were supposed to be treated identically except for the requirement to attend health and nutrition sessions. We therefore use an Instrumental Variables (IV) strategy. Our IV strategy exploits three exclusion restrictions: the assignment dummy for living in a locality `T3`, the locality average (in logs) of individual responses to the number of minutes away from the closest PAL centre, and the interaction of the two variables. The validity of the treatment status assigned in the experiment (the intention to treat, or ITT)[20] as an exclusion restriction for the IV strategy relies on the assumption that living in locality `T3` rather than `T2` only affects individual health risk factors in terms of changing the available health/nutrition related information. By excluding individuals who live in localities `T4` we rule out the possibility that treatment status is correlated with differential changes in the prices of unhealthy goods: in localities where the transfer was distributed in cash there might have been a higher demand for cigarettes, alcohol, etc.

In principle, distance from the PAL centre might proxy for the distance to other facilities, i.e. the health centre and the food market, accessibility to both of which might affect the prevalence of health risk factors.[21] While in section 2.4.5 we provide evidence to bolster confidence in the validity of our instruments, we should emphasize that all PAL localities were chosen from a set of accessible (less than 2.5km from a main road) localities with a DICONSA shop in the proximity (no more than 2.5km). These features of the design support the assumption that our measure of distance reflects only the cost of attending an extra educational course.

The main IV specification is estimated using a two step IV method suggested by Wooldridge (2002) and Angrist and Pischke (2009). In the first stage we estimate a probit model and the fitted probabilities are used as exclusion restriction

[20] See Angrist et al. (2009) for a recent application of the use of the ITT in an IV setting.

[21] The median time away from the PAL centre is 10 minutes and the standard deviation 21 minutes.

in the IV estimation of the structural equation.[22] In order to test for the validity of the overidentifying restrictions, we also report the results of a two stages least squares (2SLS) procedure. In all specifications standard errors are heteroskedasticity robust and adjusted for clustering at the locality level.

§2.4. Results

2.4.1 — First Stage Results

We consider first how the three exclusion restrictions described above are correlated to the proxies for the health and nutrition information acquired through the programme. The marginal effects of the probit estimates (see columns 1 and 2 in Table 2.5) show that the probability of attending at least one health (nutrition) related session is significantly higher in those localities where, according to the original design, the transfer was conditional on attendance at health and nutrition sessions. A 10 percentage point increase in the probability of living in a `T3` locality rather than in a `T2` one increases the probability of attending at least one health talk by 1.56 percentage points. The results are very similar for the probability of attending at least one nutrition session: a 10 percentage point rise in the probability of living in a locality `T3` increases the probability of attending a nutrition talk by 1.73 percentage points. As mentioned above, the educational courses were delivered by previously trained local community leaders. These results are consistent with the hypothesis that, because of the original design of the programme, programme administrators in localities `T2` were either not trained to deliver the health and nutrition topics or were not provided with related teaching materials. Distance from the PAL centre has a small, positive effect on the probability of attending at least one health related session. However, the effect achieves the 10% statistical significance only on the probability of attending at least one nutrition session.

For individuals living in `T3` localities the cost associated with the requirement to attend health and nutrition sessions increases with the distance they have to cover to reach the PAL centre. This explains the negative and significant marginal effect on the interaction terms in columns 1 and 2 of Table 2.5.

[22] This estimator is asymptotically efficient and the standard test statistics are asymptotically valid (see Wooldridge (2002)).

2.4.2 — Smoking and Heavy Drinking

In this section we discuss how the information provided through the programme affects the propensity to smoke and drink heavily. Table 2.6 presents the results for smoking. The ordinary least squares (OLS) estimates presented in the top panel show that attending at least one health or one nutrition session has a negative although not a significant effect on smoking behaviour.

The results of the IV estimates (see columns 1-6 in Table 2.6) suggest that attending at least one health or one nutrition specific course reduces the probability of smoking, especially among men, but the effect is never statistically significant.

In Table 2.7 we present the results for the effect of information on heavy drinking. Consistent with the evidence for smoking, the OLS results show very small and not significant effects of the topics of educational courses attended, on the propensity to consume alcohol. We find that exposure to health and nutrition information has a bigger impact on the sample of men than women. However, the marginal effect of attending at least one session on a health (nutrition) related topic is never statistically significant.

While the 2SLS estimates (see Table 2.9) are in line with the ones discussed above, the Hansen J test supports the validity of the exclusion restrictions.

In summary, our results show that the effect of the health and nutrition information received through PAL on the propensity to smoke and drink heavily is not significantly different from zero. There are two potential explanations for these results. First, smoking and heavy drinking are not common among women, and it is the women who comply with the educational requirement. Second, the existing evidence, although limited,[23] suggests that smoking and heavy drinking might not be emphasized in the sessions.

2.4.3 — Obesity

Table 2.8 presents the results for obesity. The OLS estimates suggest that attending sessions on either health or nutrition has a negative effect on waist circumference with an effect that is marginally significant in the case of nutrition related topics.

After controlling for the potential endogeneity, attending at least one session that covers health and nutrition topics has a large negative effect on the proba-

[23]Skoufias (2005) reports that up 25 themes are covered in the lectures beneficiaries have to attend in order to receive the PROGRESA transfer. However, the focus is mainly on topics that are relevant for mothers, including nutrition, hygiene, infectious diseases, immunization, family planning, etc.

bility of having a large WC. The marginal effect of attending at least one health related session is significantly different from zero only for women: a 10 percentage point increase in the probability of attending at least one health session reduces the probability of having a large WC by about 2 percentage points. The results are similar for the probability of attending at least one nutrition related course: among women, a 10 percentage point increase determines a statistically significant reduction of 1.8 percentage points in the probability of being obese. In both cases, the F tests on the excluded instruments provide strong evidence against weak instruments. Also in this case the point estimates and the significance levels of the 2SLS are in line with the ones just discussed and the overidentification test supports the validity of the exclusion restrictions (see the lowest panel of Table 2.9). It should be stressed that it is difficult to compare the results for men and women as the sample of males includes only individuals aged 31 or above.[24]

The results presented above capture the effect of health and nutrition information on the propensity to be obese among those women whose decision to attend is affected, at the margin, by the fact that the sessions are a requirement to receive the transfer. This is the so called local average treatment effect (LATE).[25] In other terms, our identification strategy does not capture the effect of the exposure to health and nutrition information on those who would have taken the courses irrespective of whether the attendance was a requirement or not.

Our results are consistent with the hypothesis that a high prevalence of female obesity can be explained, at least in part, by the fact that women have poor knowledge about health and nutrition. Another important implication can be drawn from these findings. There is not significant evidence of knowledge externalities within household as men do not appear to benefit from the health and nutrition information acquired by their wives.

2.4.4 — Information and Calorie Intake

Above, we have shown that both number and type of classes attended may significantly reduce the propensity for a large WC for women. Here, we try to provide evidence on the mechanisms that drive these results. A reduction in WC may be due to a reduction in calorie intake or increased calorie expenditure. Cutler et al. (2003) argue that the impressive rise of obesity observed in the US is due

[24] In our sample 29.5% of the women aged 18-31 have a WC above 88cm, while the percentage is 59% for women in the 32-60 age group.

[25] As a further robustness check we estimate a Wald estimator that exploits only the treatment status as exclusion restriction. While the standard errors are higher, both point estimates and significance levels are in line with the ones presented.

primarily to increased calorie intake and that calories expended have not changed significantly.

In the follow-up survey of PAL we collected individual information, based on a 24 hour recall method,[26] on the nutritional intake of children aged under 5, and their mothers. We exploit the information on mothers' intake to test whether better health and nutrition knowledge determines a change in calorie consumption. Although calorie requirements might change depending on metabolism and level of physical activity, nutritional guidelines on calorie intake provide recommendations that vary with age and gender. In Mexico the National Institute of Public Health (INSP) advises women under 20 to not consume more than 2,300 kcal per day. Women between 21 and 34 should not exceed 2,000 kcal per day, women between 35 and 54 not more than 1,850, while women over 55 are advised not to consume more than 1,700 kcal per day.[27] Based on this information, we construct a binary variable for whether a woman consumes more than the recommended amount of calories.

Formally, we use the model in eq. 2.1 to test whether health and nutrition information can affect the probability that a woman has an excessive calorie intake. Columns 1 and 2 in Table 2.10 report the results of the OLS estimates, columns 3-4 present the IV estimates. The OLS estimates display a small and not significant effect for each of the two measures of information.

When we control for potential endogeneity, we find that the proxies for the information received through the programme are negatively correlated with the probability of an excessive calorie intake. A 10 percentage point increase in the probability of attending at least one health session reduces the probability of excessive intake by almost 3.8 percentage points (statistically significant at 10%). Similarly, a 10 percentage point increase in the probability of attending at least one nutrition talk reduces the probability by around 3.3 percentage points (significant at 5%).[28]

Interestingly, there is a positive and significant association between the number of food baskets and the propensity to consume a higher than recommended calorie intake. After controlling for the endogeneity of the dummy for attending at least one nutrition session, an extra food basket increases the probability of an excessive

[26] This includes the type and the quantity of food consumed at home and outside in the previous 24 hours. Because of the randomized design, our results are unlikely to be affected by the presence of under-reporting bias.

[27] Based on a 24 hour dietary recall system in a representative sub-sample of 2,630 Mexican women aged 12-49 from the National Nutrition Survey 1999, Barquera et al. (2003) find that the median energy consumption is 1,471 kcal.

[28] The results are robust to alternative definitions of excessive calorie intake.

calorie intake by 0.5 percentage points. A priori variations in the number of baskets can proxy for variations in both quantity and quality of food intake and the positive sign of the coefficient might suggest that the quantity effect prevails on the quality one. However, no causal interpretation can be given as the number of food baskets might be potentially endogenous.

Attending health and nutrition sessions might also affect the propensity to burn calories. As stressed by Cutler et al. (2003), there are two components to calorie expenditure: voluntary exercise and involuntary expenditure associated with employment. Attendance at health related sessions might result in an appreciation of the benefits of physical activity. Unfortunately, the survey does not collect any information on time usage. With respect to involuntary calorie expenditure, it is unlikely that being better informed about health and nutrition affects the decision to work in more energy intensive jobs. Moreover, Skoufias et al. (2008) find that the effect of the PAL on labour outcomes does not show any significant changes for beneficiaries living in localities `T2` and `T3`.

In summary, our results suggest that the information conveyed through the educational component of the programme determines a significant improvement in mothers' eating habits.

2.4.5 — Econometric Concerns

In this section we provide evidence to support the validity of our instruments. The identifying assumption is that both the ITT dummy and the average distance from a PAL office (plus the interaction term) can affect the propensity to smoke, drink heavily and be obese only in its effect on the probability of being exposed to health and nutrition information. The first concern is that the exclusion restrictions might be correlated with the quality of health provisions in the locality.

While educational courses are mostly delivered by local inhabitants, better qualified health staff and/or educational material might be deployed in localities where according to the initial design it was a requirement that eligible households would receive health and nutrition courses. Of more concern is that average travel time to a PAL centre might be a proxy for the average distance from a health centre and this can have a direct effect on the health behaviour of eligible adults. In order to study whether our instruments are correlated with differences in the cost of access to health services, we test whether they are correlated with measures of health status that are unlikely to be affected (at least in the short term) by information received via the programme. We do not find any significant correlation between our exclusion restrictions and the number of days of incapacity

or morbidity (see columns 1 and 2 in Table 2.11). We also check whether the instruments are correlated with a direct measure of healthcare quality, such as probability of being advised to undertake treatment for hypertension once the disease has been diagnosed. Also in this case the correlation is not significant.

Beneficiary households in localities belonging to group `T2` and `T3` receive a food basket with the same composition. Therefore, we do not expect any differential change of prices between the two groups of localities. If the distance from a PAL centre is correlated with the distance from stores and food market, our instrument might be correlated with the prices of goods, such as cigarettes, alcohol and food. The locality questionnaire collects information about prices of a large set of goods. Therefore, we test whether our instruments are significantly correlated with the average price of 4 categories of goods: alcohol (*aguardiente*), chocolate, candies and fish. Out of the 100 localities used in the main specification, we measures prices for 99. Table 2.12 shows that none of our exclusion restrictions is significantly correlated with the prices of goods that are likely to be related with the drinking and eating habits of programme beneficiaries.

§2.5. Conclusions

It has been well documented that CCT programmes have strong positive effects on the well-being of beneficiary households, but little is know about how the individual components of these programmes contribute to the combined result. This paper assesses the impact of the educational component of a nutrition programme implemented in rural Mexico, on the health behaviour of adults living in beneficiary households. We exploit the randomized evaluation design of PAL to study how the requirement to attend sessions on health and nutrition affects the propensity to smoke, drink heavily and be obese, in male and female adults.

After controlling for potential endogeneity in the different measures, we find no significant evidence that the educational component affects smoking and drinking behaviour. Our findings do provide evidence that exposure to health and nutrition contributes to a large and significant reduction in the probability among women of having a large waist circumference. In order to shed light on the mechanisms that drive this effect we study whether attending health and nutrition sessions affects the calorie intakes of mothers with at least one child aged less than 5. We find that exposure to health and nutrition information significantly reduces the probability that an adult woman consumes an amount of calories that is higher than the age-gender specific threshold recommended by the INSP in Mexico. These results support the hypothesis that the requirement to attend content specific courses, by

increasing women's knowledge about nutritional issues, can improve their eating habits.

This study contributes to the current debate on whether transfers should or should not be conditional. Our results suggest that improvements in nutrition related outcomes, especially among adult women, can result from the requirement to attend health and nutrition sessions. It has been documented that, by targeting women as the transfer recipients, CCTs reduce the household consumption of unhealthy goods and increase food and child related expenditure. However, providing specific information can contribute to an effective improvement in the nutritional outcomes of all household members. While women seem to take advantage of the information they acquire through the sessions, men do not display any significant behavioural changes. Therefore, future design of transfer programmes should address explicitly this lack of within household spillovers. Future research will focus on two important issues that have not been covered in this work. First, since additional requirements to receive the transfer might affect the health behaviour of eligible adults,[29] the overall effect of conditionalities should be tested. Second, in order to improve the cost effectiveness of transfer programmes, the net benefit of food baskets vis a vis the net benefit of conditionalities should be quantified.

More generally, our results show that lack of information plays a key role in explaining the dramatically high prevalence of female obesity in developing countries. Policies addressed to improving health knowledge can have large and significant effects.

[29] For example, individuals might decide to change their habits after being screened for high blood pressure and diabetes.

Table 2.1: Descriptives at the Baseline

Treatment Type	T1	T2	T3	T4
Male	0.464	0.480	0.484	0.474
	(0.499)	(0.500)	(0.500)	(0.499)
Age	35.890	35.976	35.466	36.447
	(12.802)	(13.015)	(12.860)	(13.195)
Head of Household	0.395	0.382	0.392	0.380
	(0.489)	(0.486)	(0.488)	(0.486)
No Insurance	0.854	0.812	0.884	0.873
	(0.353)	(0.391)	(0.321)	(0.334)
Literacy	0.796	0.797	0.791	0.787
	(0.403)	(0.403)	(0.406)	(0.409)
No Schooling	0.185	0.179	0.182	0.192
	(0.388)	(0.383)	(0.386)	(0.394)
Primary	0.516	0.515	0.555	0.539
	(0.500)	(0.500)	(0.497)	(0.499)
Secondary	0.193	0.197	0.160	0.175
	(0.395)	(0.398)	(0.367)	(0.380)
Tertiary	0.098	0.104	0.097	0.086
	(0.298)	(0.305)	(0.296)	(0.280)
Indigenous Language	0.181	0.209	0.140	0.142
	(0.385)	(0.407)	(0.347)	(0.349)
Spanish Language	0.154	0.144	0.107	0.108
	(0.361)	(0.351)	(0.310)	(0.311)
Last week worked	0.476	0.479	0.471	0.465
	(0.499)	(0.500)	(0.499)	(0.499)
Own House	0.837	0.849	0.834	0.833
	(0.369)	(0.358)	(0.372)	(0.373)
Own Land	0.736	0.764	0.718	0.741
	(0.441)	(0.425)	(0.450)	(0.438)
Observations	3768	3756	3834	3986

Note: T1 denotes the control localities; T2 denotes the localities that according to the original design receive the transfer with no requirement of attending health and nutrition sessions; T3 denotes the localities that receive the transfer in kind subject to the educational requirement; T4 denotes the localities that receive the transfer in cash subject to the educational requirement.

Table 2.2: Prevalence of Health Risks by Gender

	Baseline			Follow-Up		
	Full Sample	Women	Men	Full Sample	Women	Men
Smoking	0.076	0.010	0.148	0.088	0.012	0.175
	(0.264)	(0.100)	(0.355)	(0.284)	(0.108)	(0.380)
Heavy Drinking	0.021	0.002	0.042	0.036	0.003	0.073
	(0.143)	(0.047)	(0.200)	(0.187)	(0.061)	(0.261)
BMI≥30		0.258				
		(0.437)				
WC≥ 88(102)				0.381	0.486	0.164
				(0.486)	(0.500)	(0.370)

Note: The sample includes individuals in the age group 18-60. Heavy drinking takes the value 1 if a woman (man) reported drinking at least 7 (14) units of alcohol in the week before the interview. Individuals with a BMI equal to or above 30 are considered at risk. Women (men) with WC equal to or above 88 (102) cm are considered at high risk of obesity related diseases. At baseline, the BMI is collected only for women younger than 52. In the follow-up, data on WC are collected for all adult women and for men aged 31 or over.

Table 2.3: Prevalence of Health Risks by Treatment Type

Treatment Type	T1	T2	T3	T4
	Baseline			
Smoking	0.086	0.068	0.073	0.075
	(0.281)	(0.252)	(0.260)	(0.263)
Heavy Drinking	0.022	0.023	0.020	0.018
	(0.148)	(0.150)	(0.141)	(0.134)
BMI≥30	0.273	0.248	0.246	0.263
	(0.446)	(0.432)	(0.431)	(0.440)
	Follow-Up			
Smoking	0.091	0.095	0.085	0.083
	(0.287)	(0.293)	(0.280)	(0.276)
Heavy drinking	0.042	0.042	0.033	0.030
	(0.200)	(0.200)	(0.178)	(0.171)
WC≥88(102)	0.372	0.388	0.366	0.397
	(0.483)	(0.487)	(0.482)	(0.489)

Note: The sample includes individuals in the age group 18-60. At baseline the BMI is collected only for women younger than 52. In the follow-up data on WC are collected for all adult women and for men aged 31 or over.

Table 2.4: PAL Compliance

	Program Take Up	Food Baskets	Classes Attended	At least 1 Organiz. sess.	At least 1 Health sess.	At least 1 Nutrit. sess.
T3	0.915	13.477	4.973	0.360	0.470	0.700
	(0.280)	(5.166)	(3.945)	(0.480)	(0.499)	(0.461)
T2	0.930	13.016	4.160	0.405	0.344	0.557
	(0.256)	(5.007)	(4.022)	(0.491)	(0.475)	(0.497)
Diff	-0.015	0.461	0.813	-0.046	0.125**	0.143***
	(0.031)	(0.481)	(0.523)	(0.045)	(0.050)	(0.051)

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors on the Diff coefficients are clustered at locality level. The sample includes households living in localities T2 and T3.

Table 2.5: First Stage Regressions

	Health Session (Y/N)	Nutrition Session (Y/N)
T3	0.156***	0.173***
	(0.052)	(0.051)
Log Distance	0.082	0.092*
	(0.053)	(0.053)
T3*Log Distance	-0.215***	-0.202***
	(0.077)	(0.075)
Observations	5850	5848

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are clustered at locality level. The sample includes individuals in the age group 18-60 living in localities T2 and T3. *Log Distance* is the logarithm of the average number of minutes respondents have to cover to reach the locality's PAL office. Additional controls include the number of baskets, age, age squared, a dummy for the head of household status, marital status, dummies for educational attainment, dummies for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 2.6: The Effect of Information on Smoking

	Full Sample	Women	Men	Full Sample	Women	Men
			OLS			
Health Session (Y/N)	-0.011	-0.007	-0.014			
	(0.009)	(0.004)	(0.018)			
Nutrition Session (Y/N)				-0.011	-0.003	-0.017
				(0.011)	(0.005)	(0.022)
Baskets	0.000	-0.000	0.000	0.000	-0.000	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.000)	(0.002)
Observations	5874	3099	2775	5872	3098	2774
			IV			
Health Session (Y/N)	-0.032	-0.025	-0.023			
	(0.062)	(0.019)	(0.118)			
Nutrition Session (Y/N)				-0.033	-0.019	-0.037
				(0.061)	(0.019)	(0.121)
Baskets	0.000	0.000	0.001	0.000	0.000	0.001
	(0.001)	(0.000)	(0.002)	(0.001)	(0.000)	(0.002)
Observations	5874	3099	2775	5872	3098	2774
F Test Excluded Instr	18.124	15.705	19.271	24.535	22.495	25.263

Note: The dependent variable is the dummy for whether the individual smokes or not. *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are adjusted for clustering at locality level. The sample includes individuals in the age group 18-60 living in localities `T2` and `T3`. Additional controls include age, age squared, a dummy for the head of household status, marital status, dummies for educational attainments, dummy whether she speaks the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 2.7: The Effect of Information on Heavy Drinking

	Full Sample	Women	Men	Full Sample	Women	Men
			OLS			
Health Session (Y/N)	-0.008	-0.001	-0.015			
	(0.006)	(0.002)	(0.012)			
Nutrition Session (Y/N)				0.004	-0.001	0.010
				(0.007)	(0.003)	(0.014)
Baskets	0.000	-0.000	0.001	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Observations	5872	3096	2776	5870	3095	2775
			IV			
Health Session (Y/N)	-0.029	-0.013	-0.032			
	(0.035)	(0.013)	(0.065)			
Nutrition Session (Y/N)				-0.029	-0.012	-0.039
				(0.037)	(0.012)	(0.070)
Baskets	0.000	-0.000	0.001	0.000	-0.000	0.001
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Observations	5872	3096	2776	5870	3095	2775
F Test Excluded Instr	17.951	15.991	18.545	24.519	22.719	24.871

Note: The dependent variable is the dummy for whether a woman (man) had 7 (14) or more drinks the week before the interview.
*** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are adjusted for clustering at locality level. The sample is restricted to individuals in the age group 18-60 living in localities `T2` and `T3`. Additional controls include age, age squared, dummy for head of household status, marital status, dummies for educational attainment, dummy for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 2.8: The Effect of Information on Obesity

	Full Sample	Women	Men	Full Sample	Women	Men
			OLS			
Health Session (Y/N)	-0.021	-0.022	-0.018			
	(0.015)	(0.019)	(0.024)			
Nutrition Session (Y/N)				-0.036*	-0.036	-0.037
				(0.018)	(0.022)	(0.029)
Baskets	-0.001	-0.002	-0.000	-0.001	-0.002	0.000
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Observations	3606	2424	1182	3604	2423	1181
			IV			
Health Session (Y/N)	-0.187**	-0.204**	-0.168			
	(0.085)	(0.100)	(0.142)			
Nutrition Session (Y/N)				-0.191**	-0.180**	-0.220
				(0.089)	(0.087)	(0.170)
Baskets	-0.000	-0.001	0.001	0.001	-0.000	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Observations	3606	2424	1182	3604	2423	1181
F Test Excluded Instr	13.609	12.034	13.369	19.129	19.107	15.210

Note: The dependent variable is the dummy for whether a woman (man) has a WC equal to or above 88 (102) cm.
*** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are adjusted for clustering at locality level. The sample is restricted to women (men) in the age group 18-60 (31-60) living in localities `T2` and `T3`. Additional controls include age, age squared, a dummy for head of household status, marital status, dummies for educational attainment, dummy for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 2.9: Two Stages Least Square

			Smoking			
Health Session (Y/N)	-0.039	-0.025	-0.037			
	(0.062)	(0.019)	(0.120)			
Nutrition Session (Y/N)				-0.041	-0.022	-0.047
				(0.066)	(0.020)	(0.131)
Baskets	-0.000	-0.000	-0.000	0.000	0.000	-0.000
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Observations	5822	3070	2752	5820	3069	2751
F Test Excluded Instr	6.082	5.299	6.442	7.905	7.418	7.955
Hansen J Test	1.757	1.560	2.819	1.609	1.452	2.559
P value Hansen	0.415	0.458	0.244	0.447	0.484	0.278
			Heavy Drinking			
Health Session (Y/N)	-0.030	-0.015	-0.033			
	(0.036)	(0.013)	(0.067)			
Nutrition Session (Y/N)				-0.042	-0.017	-0.057
				(0.038)	(0.013)	(0.071)
Baskets	0.000	0.000	0.001	0.001	0.000	0.001
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Observations	5820	3067	2753	5818	3066	2752
F Test Excluded Instr	6.020	5.390	6.203	7.944	7.528	7.871
Hansen J Test	2.680	2.969	2.150	2.374	2.286	1.879
P value Hansen	0.262	0.227	0.341	0.305	0.319	0.391
			Obesity			
Health Session (Y/N)	-0.179**	-0.205**	-0.164			
	(0.083)	(0.098)	(0.136)			
Nutrition Session (Y/N)				-0.212**	-0.203**	-0.272
				(0.099)	(0.099)	(0.187)
Baskets	-0.000	-0.001	0.001	0.001	-0.000	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Observations	3606	2424	1182	3604	2423	1181
F Test Excluded Instr	4.630	4.096	5.570	6.258	6.284	5.314
Hansen J Test	1.539	0.793	2.846	0.726	0.731	1.295
P value Hansen	0.463	0.673	0.241	0.696	0.694	0.523

*** denotes significance at 1%, ** at 5% and * at 10%. The sample includes individuals living in localities `T2` and `T3`. Additional controls include age, age squared, a dummy for head of household status, marital status, dummies for educational attainment, dummy for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 2.10: Information and Excessive Caloric Intake

	OLS		IV	
Health Session (Y/N)	0.029		-0.376*	
	(0.028)		(0.226)	
Nutrition Session (Y/N)		0.010		-0.324**
		(0.036)		(0.165)
Baskets	0.004	0.004	0.006*	0.005*
	(0.003)	(0.003)	(0.003)	(0.003)
Observations	935	935	935	935
F Test Excluded Instr			9.779	19.604

Note: The dependent variable is the dummy for whether a woman has a calorie intake higher than recommended (see text for explanation).
*** denotes significance at 1%, ** at 5% and * at 10%. The sample includes mothers with at least 1 child aged under 5 living in localities `T2` and `T3`. Additional controls include age, age squared, a dummy for head of household status, marital status, dummies for educational attainment, dummy for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 2.11: Alternative measures of health

	Morbidity Days	Incapacity Days	Advised Hypert. Treatment
`T3`	-0.270	-0.514	-0.049
	(0.224)	(0.363)	(0.055)
Log Distance	-0.112	-0.215	-0.032
	(0.263)	(0.363)	(0.068)
`T3`*Log Distance	-0.175	-0.359	0.059
	(0.375)	(0.448)	(0.116)
Observations	5817	1300	473

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are adjusted for clustering at locality level. The sample includes individuals in the age group 18-60 living in localities `T2` and `T3`. Additional controls include the number of food baskets, age, age squared, a dummy for head of household status, marital status, dummies for educational attainments, dummy for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 2.12: Locality Prices

	Price Alcohol	Price Chocolate	Price Candies	Price Fish
`T3`	-7.206	-0.658	9.078	0.413
	(5.391)	(7.116)	(6.610)	(6.015)
Log Distance	-2.667	-7.806	-9.547	1.047
	(6.202)	(8.187)	(7.605)	(6.920)
`T3`*Log Distance	-4.928	-0.785	8.376	5.363
	(8.368)	(11.045)	(10.260)	(9.336)
Observations	99	99	99	99

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Regressions at locality level. Remaining controls include locality averages for the variables: age, gender, marital status, educational attainments, use of the indigenous language, household assets and additional welfare programme. All regressions control for state fixed effects. Prices are expressed in *pesos*.

CHAPTER 3

GP Quality and the Propensity for Screening Tests

We construct an individual measure of doctors' quality using microeconomic data on the performance of general practitioners (GPs) available in a sample of individuals aged 50+ in eight European countries. Exploiting the large variation between countries and individuals, we relate the quality of GP to the propensity for two standard screening tests, mammography and colonoscopy, recognizing the potential endogeneity of GP quality. The findings imply that GP quality has a positive effect on the propensity for screening against breast and colon cancer. Moreover, our results suggest a complementarity between quality of primary care and the ability to acquire information, as proxied by formal education and cognitive abilities.

§3.1. Introduction

Many socioeconomic variables tend to be strongly correlated with better health outcomes and healthier behaviour. The literature has documented a strong positive association between income and health (Smith (1998)). Furthermore, people with better education tend to have better health, even holding income, occupation and other socioeconomic variables constant (Cutler and Lleras-Muney (2008)). In this paper we study the role of the quality of the health system as a further important determinant of health outcomes. Previous econometric studies have investigated the role of medical advice for people with specific conditions.[1] For instance, Kenkel and Terza (2001) study the effect of medical advice on drinking behaviour of individuals affected by hypertension. However, there is no evidence

[1] Controlled clinical trials provide evidence on the effectiveness of medical advice in specific contexts. For instance, in a multi-national trial the World Health Organization Brief Intervention Study Group (1996) found that at-risk drinkers who received advice reported drinking approximately 17 percent less than those in the control group.

on how doctors' quality affects the health behaviour in a sample that is representative of the population at large. In this paper we fill this gap and use an international sample of elderly individuals to address two related issues: (1) How does the quality of doctors affect healthcare prevention? (2) Is the quality of doctors a substitute or a complement of formal education and cognitive skills in determining screening decisions?

Our internationally comparable dataset includes eight of the countries (Austria, Belgium, Denmark, France, Germany, Italy, Spain, and Switzerland) covered by the Survey of Health, Ageing and Retirement in Europe (SHARE). We exploit information available in SHARE to construct a measure of General Practitioner (GP) quality based on the completion of standard geriatric assessments. To our knowledge, this work is the first attempt to construct an individual measure of primary care quality and to relate it to patients' decision.[2] We focus on GP quality because GPs usually represent the first contact when seeking medical advice and in all the countries covered by our study GP coverage is free of charge and universal.

In order to measure how GP quality can affect healthcare prevention, we study two screening tests, mammography and colonoscopy, that are strongly recommended to asymptomatic individuals aged 50 or above, regardless of their health history. Both these tests are either free of charge or heavily subsidized in the countries included in our sample.

Understanding how quality of health professionals affects individuals' screening behaviour and how it interacts with education and cognitive abilities poses problems of measurement and of selection bias. Indeed, the potential recall bias of patients and the non-random assignment of GP quality might drive a spurious correlation between the quality score and the decision to undertake preventive screening. In order to address the potential endogeneity of the GP quality score we adopt an instrumental variables (IV) approach that relies on two sets of variables: regional variation in quality indicators of primary care and health promotion, and proxies for whether respondents have previously been diagnosed a chronic disease with a strong genetic component, such as arthritis, asthma and osteoporosis.

Our econometric results suggest that GP quality has a positive and significant effect on the propensity for preventive screening. We also find that the effect of education and cognitive abilities (as measured by memory and verbal fluency skills) in determining the decision to screen increases with GP quality. Our find-

[2]Morris and Gravelle (2008) investigate the relationship between GP supply and body mass index in the UK using information at the area level.

ings are consistent with the hypothesis that more educated individuals can better process and take advantage of the information provided by GPs.

Since governments play an important role in the allocation of GPs, the results imply that an increase in GP quality improves health prevention and ultimately health. However, since GP increases also the association between health and education (the health-education gradient), it may not reduce health disparities, at least among the elderly. The remaining of the paper is organized as follows. In Section 3.2 we describe the data and provide descriptive statistics on the percentage of people covered by GPs and their quality. The empirical results are presented in Section 3.3. In Section 3.4 we further investigate if the health-education gradient is affected by GP quality. Section 3.5 concludes.

§3.2. The data

We use the most recent data release of the first wave of the Survey of Health, Aging and Retirement in Europe (SHARE), a survey of the population aged 50+ conducted in 2004.[3] The survey involved 19,286 households and 32,022 individuals, covering a wide range of topics, including physical health, socioeconomic status, income and intensity of social interaction.

Some questions refer to the household (for instance, income), others to each eligible member within the household and to his or her partners; this is the case for the indicators of health status and behaviour.[4] SHARE also includes a section on preferences, beliefs, attitudes and other items, including the demand for preventive care, and questions on the assessments performed by the GP. The SHARE data are thus particularly useful for the issues we are investigating.

Of 11 countries covered by SHARE, we exclude Greece, the Netherlands and Sweden, because in these countries GPs play a less important role. In Greece primary care is just beginning to develop and only a small fraction of the population is registered with a GP. Before the 2006 reform, in the Netherlands there were two health insurance schemes; GP consultation was compulsory only under the

[3]The SHARE data collection has been primarily funded by the European Commission through the 5th framework program (project QLK6-CT-2001-00360 in the thematic program Quality of Life). Additional funding came from the US National Institute on Ageing (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01 and OGHA 04-064). Data collection in Austria (through the Austrian Science Foundation, FWF), Belgium (through the Belgian Science Policy Administration) and Switzerland (through BBW/OFES/UFES) was nationally funded. The SHARE data set is presented in Börsch-Supan et al. (2005).

[4]The questionnaire and the sample design are patterned after the US Health and Retirement Survey (HRS) and the English Longitudinal Study of Ageing (ELSA). Börsch-Supan et al. (2005) report details on sampling, response rates and definitions of variables.

sick fund system, which covered only 60 percent of the population.[5] The Swedish health system has traditionally been hospital-centered, as the very low ratio of GPs to specialists shows (Simoens and Hurst (2006)). Our final sample thus includes 12,405 men and 15,177 women aged 50-85 in Austria, Belgium, Denmark, France, Germany, Italy, Spain, and Switzerland.

3.2.1 — Screening Test Compliance

We focus on two cancer screening tests: mammography and colonoscopy. Early detection of breast and colon cancer significantly reduces mortality. The American Association of Colon and Rectal Surgeons recommends regular screening after age 50.[6] According to the American Cancer Society, women aged 40 and above should have a mammogram performed every year and for as long as they are in good health.[7] In most European countries mammography is recommended every second year to women aged 50 and above, regardless of health history.

Field studies in the medical literature show that patient compliance is much higher for mammography than for colonoscopy, even among groups at risk.[8] Colonoscopy and mammography are interesting also because the costs and benefits vary across individuals. If colonoscopy and mammography are provided free of charge by a National Health System, the cost consists mainly in perceived invasiveness. The benefit of early detection of a disease depends on health status and on time preferences, as pointed out by Picone et al. (2004): better health and a lower time preference are associated with higher demand for preventive screening. Table 3.1 shows the percentage of women aged 50-85 who had a mammography done in the two years before the survey and the percentage of men and women who had colonoscopies at least once in the previous ten years. In France the percentage of women doing breast screens is above 70 percent, while it is just 22 percent in Denmark. France, Germany and Austria show the highest rates for colonoscopy; in Spain only 8 percent of women and men had that test done. Institutional factors explain part of the international differences in screening rates and protocols.

In Austria, Germany, France, Italy, and Spain women aged 50-69 are invited to take a mammography at least once every two years free of charge.[9] In Denmark

[5] Only low income employees and people aged 65 and above are eligible for this fund.

[6] For details see www.fascrs.org/.

[7] See www.cancer.org/.

[8] Urban et al. (1994) find a compliance rate of about 40 percent for mammography in a population of 50+ women.

[9] In France the age group extends to women 74 years old; in some Autonomous Communities in Spain the limit is 64/65.

only two out of fourteen communities have established a breast cancer prevention programme, which currently covers only 20 percent of the Danish female population.

The scenario for colorectal cancer screening is different. Only in a few countries special programmes are in place (see Holland et al. (2006)). In Austria all men and women 50+ are informed about the risks of colorectal cancer and invited to take a colonoscopy. In Italy, since 2001, colonoscopy every five years has been free of charges (exempted from co-payment) for men and women age 45+ and for the population at risk as defined by the Ministry of Health. The testing protocols for this form of cancer vary. In France individuals at risk are advised to have the colonoscopy only if the fecal blood test is positive; in Italy and Germany it is recommended to all individuals at risk; and in the other countries there are no special provisions for colorectal cancer screening.[10]

3.2.2 — The quality of General Practitioners

Recently the OECD and the World Health Organization have constructed quality indicators for primary medical care, measuring obesity and diabetes prevalence, smoking rate, flu vaccination for high-risk groups, and colon cancer screening (see OECD (2004)). Here, we are interested in measuring the quantity and quality of information that public healthcare systems give to people who make health-related decisions. Because of universal and compulsory registration, the quality of general practitioners is crucial to this function.

In principle a variety of different health professionals can provide primary healthcare but in most countries GP is the most common point of first contact. With a few exceptions, GP care is provided free of charge and on a universal basis by National Health Systems.[11] According to a recent definition, "the GP engages with autonomous individuals across the field of prevention, diagnosis, cure, care and palliation" (Brotons et al. (2005)).

Although the organization and provision of GP care differ from country to country, everywhere one of the GP's most important tasks is to provide health-related information and explain treatment options to patients (see Scott (2000)). Moreover, high quality general practice might shorten decision times and track patients' behaviour more closely (Cutler and Lleras-Muney (2008)), which could

[10] In France the introduction of a colon cancer screening programme hinges on the result of trials in 22 Departments. More detailed information about the regulatory frameworks in the EU countries can be found in Holland et al. (2006).

[11] In Germany, individuals pay small charges for some additional services.

be particularly relevant for colonoscopy.[12]

Using the SHARE drop-off questionnaire, we construct a GP quality indicator at individual level, with six measures of geriatric assessment. These are straightforward aspects of medical consultation that should be easily recognized by the respondents, regardless of education. In particular, SHARE respondents report whether their GP asks about physical exercise, falls and drugs, suggests regular physical exercise or checks their weight. We convert these questions into dummy variables, so the GP quality index ranges from zero (the GP does none of the above) to six (all of the above).

Table 3.2 illustrates the international variability of GP coverage and the quality index. Consistent with the free and universal access, 94 percent of the individuals in our sample are registered with a general practitioner. The countries where the GP quality score is highest are France and Spain (above 3), while Denmark has the lowest (2.1). In Italy and Denmark, 25 percent of the sample receive no geriatric assessment, 20 percent in Austria and 16 percent in Spain reported they received all the assessments. These results basically accord with patients' evaluations and country-level indicators of the quality of healthcare. Grol et al. (2000), using the European Task Force on Patient Evaluations of General Practice Care (EUROPEP), find a generally negative opinion of the geriatric assessments of GPs in Denmark and the other Scandinavian countries. France, Austria and Germany are the countries with the highest GP density, Denmark the lowest (see Simoens and Hurst (2006)).

Interestingly, this indicator is strongly correlated with the probability of having been advised to get a flu vaccination in the year before the survey, which is strongly recommended to people over 65. Figure 3.1 plots this probability against the GP score. We take the positive association between the two variables as an indication that the GP score might be a proxy for the amount of medical information transmitted by health professionals.

§3.3. Baseline Model

In order to test how GP quality affects the propensity to screen, we estimate the following probit model:

$$Pr(Y_i = 1) = \Phi(\beta_0 + \beta_1 GP_i + \gamma' X_i) \tag{3.1}$$

[12] People who take the test must follow a special diet for up to three days beforehand the test and are given a laxative to clear their colon. Before the examination they are given a sedative by an injection into vein.

where Y_i takes value 1 if individual i undertakes the screening test, GP_i is the general practitioner's quality score of individual i; X_i includes years of formal schooling, age, marital status, presence of children, disposable income, occupational status, the number of limitations in Instrumental Daily Activities (IADL) and social activities.

Since for the elderly formal educational attainments might not reflect current ability to acquire information, we also investigate the separate role of current cognitive skills. The cognitive psychology literature identifies four main domains of ability: orientation, memory, executive function and language. These abilities depend on genetic endowments and environmental factors, such as childhood home environment and education, and change over time, see Richards et al. (2004). In particular we test whether memory skills (recall) and planning and executive functions (fluency) increase the propensity to screen.[13]

In order to control for variations in the supply of healthcare we also include the waiting time (in months) for outpatient surgery examination. This is defined as the average at regional level of the individual responses on the number of months waited for their last outpatient examination.[14] Differences in the gender composition at regional level are controlled by including the regional proportion of males aged 50 or above. All the regressions control for country fixed effects.

Sample means for variables used in the estimation are reported in Table 3.3 separately for those who undertake mammography and colonoscopy tests and for those who don't. On average women who undertake the mammography display more years of formal schooling, better recall and executive skills than women who don't. Participation in social activities tends to be more intense for women who screen for breast cancer than for the ones who don't. With respect to health supply, women who screen have on average a better GP score and live in regions with shorter waiting times. Similar patterns are found for individuals who undertake colonoscopy.

Even though the access to GP is universal and free of charge, individuals are allowed to choose their GP and eventually change him without any monetary cost. Therefore, GP quality might be endogenously determined. Second, our index is based on self reported answers. The failure to recall whether the GP performed a

[13] In SHARE the fluency indicator is obtained by asking respondent to name as many animals as she or he can in exactly one minute. Each respondent is then given a score, which is equal to the number of animals that she or he can name. To construct the memory indicator, respondents are first submitted a list of ten words, and then asked to list which ones they remember. The indicator is constructed by counting the number of words recalled, and it ranges from 0, in case no word is recalled, to 10. More details on this indicator can be found in Christelis et al. (2005).

[14] Our results are robust to alternative measures of the waiting time.

certain assessment might be correlated with unobservable traits that in turn might be correlated with the propensity to screen. Third, even though the assessments should be performed regardless of the patient health history, in practice GPs might decide to perform them only on individuals with a specific health history or particular symptoms. Therefore, the coefficient might be biased.[15] To address these concerns we instrument GP quality using two different sets of instruments.

The first set of instruments includes two variables that proxy for the investment in primary care at regional level: flu vaccination coverage for high risk individuals and the smoking rate. The first variable is the regional proportion of individuals aged 65 or above who answered yes to the question whether they got a flu shot in the year before the survey. The second variable is the ratio of the number of smokers over the total population in the region. According to the OECD (2004), the former is an indicator of quality of preventive care in the area, while the second measures the quality of health promotion.

It is understood that the health system can affect the vaccination coverage in risk groups through medical education, awareness campaigns and establishing remind and recall systems. Both educational campaigns and cessation counseling have been assigned an important role in reducing smoking rates. The rationale behind our instruments is straightforward: on average, in regions with higher investments in preventive care and health promotion it is easier to find a better GP. Using the territorial units classification NUTS2 adopted by EUROSTAT, we are able to calculate our measures of investments in primary healthcare for 102 regions. The identification assumption is that, conditional on the average waiting time in the region and other regional characteristics, flu vaccination coverage and smoking rate can affect the take up of colonoscopy and mammography only by affecting the average quality of general practitioners.

A potential violation might rise if our instruments proxy for the quality of healthcare services other than the primary care ones. In order to bolster confidence in the identifying assumption, we test whether flu vaccination coverage and smoking rates are correlated with two indicators that are extensively used to measure the quality of secondary care: the number of hospital beds and the number of physicians in the region.[16] Reassuringly, we can never reject the null hypothesis of zero correlation.

[15]Since in a probit model the marginal effect is a function of the coefficient as well as of the derivative, the marginal effect of other variables might be biased as well of the conditional density function. For notational simplicity, in this work we will use the coefficient when referring to the marginal effect.

[16]These two indicators are provided in the EUROSTAT REGIO database but they are not available for the full list of regions included in our sample.

Kenkel and Terza (2001), when studying the effect of medical advice on drinking behaviour of people affected by high blood pressure, use health insurance status, physician contacts, and health problems as instruments for medical advice. Building up on their strategy, we use information on whether the individual has been diagnosed arthritis, asthma and osteoporosis in the past to construct the second set of instruments. The validity of the instruments relies on the assumption that the diagnosis of these conditions are significantly correlated with GP quality but uncorrelated with unobservable characteristics that determine propensity to screen for cancer. Individuals who have been diagnosed these chronic diseases in the past are more likely to pay attention to GP quality. According to the medical literature, the three conditions we use as instruments, while very common among elderly, are characterized by a strong genetic component. This minimizes the potential bias due to behavioral traits that are both correlated with the probability of developing these conditions and the propensity to screen for cancer. Moreover, there is no evidence that individuals who suffer from asthma, arthritis and osteoporosis display a higher risk of contracting either breast or colon cancer. Therefore, we read this evidence as support for the assumption that the instruments are uncorrelated with the error term in eq. 3.1.

Table 3.4 shows the results of the first stage regressions. Both sets of instruments are strongly correlated with our measure of GP quality. The signs are consistent with our predictions, except for the regional smoking rate (whose coefficient is not statistically different from zero). Education displays a weak and not significant negative correlation with GP quality. This result is consistent with previous findings. Indeed, Wagstaff (1986) finds a negative effect of schooling on the number of physician visits in the last 18 months. Erbsland et al. (2002) finds a negative effect of schooling on the number of GP visits using the 1986 West German Socio-Economic Panel. The number of limitations in IADL is strongly correlated to GP quality.

Both income and social activities display a weak and not significant negative correlation with GP score. In regions with longer waiting times average GP quality tends to be worse, but the correlation is not statistically different from zero. Finally, columns 2 and 5 show that individuals with better recall skills tend to be associated with lower GP scores, perhaps because respondents with worse memory tend to overstate the number of assessments completed by their GP.

3.3.1 — Mammography

Table 3.5 reports the estimates of eq. 3.1 for mammography. Columns 1-3 use flu vaccination and smoking rates as instruments for the individual measure of GP quality. In columns 4-6 the GP quality score is instrumented with dummies for whether arthritis, asthma and osteoporosis were diagnosed in the past. The estimation strategy is based on a control function approach that augments the structural equation with first stage residuals and its square. GP quality is positively and significantly correlated with the probability of taking the test. When we instrument the GP quality score with flu vaccination and smoking rate at regional level, we find that an increase by one point in the GP score is associated with an increase in the probability of undertaking the mammography by around 11 percentage points. The results are not statistically different when we instrument the score with dummies for the diagnosis of arthritis, asthma and osteoporosis: one point increase in the score increases the probability by about 15 percentage points. In both cases, the Cragg Donald test suggests that the instruments are strongly correlated with the individual measure of GP quality. The Hansen statistic supports the validity of the instruments for both specifications.

Consistent with previous evidence, education has a positive and significant effect on the probability of undertaking the test in both specifications. An extra year of education increases the probability by about 0.9 percentage points, confirming the positive association between education and health that has been documented for the US (Cutler and Lleras-Muney (2008)) and the UK (Banks et al. (2007)). Memory recall has a large and very significant effect on the propensity to screen for breast cancer: one standard deviation increase of the memory score increases the probability of undertaking mammography by 3.4 percentage points (column 2 in Table 3.5). One standard deviation increase in the fluency score increases the probability of screening by 1.8 percentage points (see column 3). The income coefficient signals that households' resources are strongly and positively correlated with screening. Women who experience more physical problems, as measured as by the number of limitations in IADL, are significantly less likely to screen. This might either be explained by the fact that physical limitations restrict the access to health infrastructures or that women who are already in bad health have a lower expected utility from the investment in prevention.

Recent work shows that social networks affect the incidence of health conditions and healthcare utilization, see Devillanova (2008), and Deri (2005). Social activities might therefore represent a channel through which people acquire information on health (by word-of-mouth or observational learning). We rely on

a set of questions on seven kinds of activities engaged in the month prior to the interview.[17] We convert the seven variables into a score of 0 to 7. The effect of social activities is positive and precisely estimated. The coefficient indicates that an additional social activity raises test compliance by about 2 percentage points, supporting the hypothesis that social interactions increase awareness of health risks and lower the cost of acquiring health-related information. Our primary interest here is measuring the quality of the primary care, but other aspects of health supply might also be relevant to the decision to screen. In particular, long waiting times might discourage women from undertaking the test. This is confirmed by the negative and significant effect of the average number of months individuals have to wait before receiving an outpatient treatment.

3.3.2 — Colonoscopy

We turn now to the determinants of the propensity for colonoscopy. In Table 3.6 we report the estimates for eq. 3.1. As for mammography, we check the robustness of our results by exploiting the two different sets of instruments we have described above. When we use as an instrument the indicators for investment in primary care at regional level, we find that an increase by one point in the GP index determines a rise by about 8 percentage points in the propensity to screen for colon cancer. The size of the effect is larger when we control for the endogeneity of the GP index by using proxies for whether the individual has been diagnosed arthritis, asthma and osteoporosis in the past: one point increase in the GP score increases the probability of screening for colon cancer by 20 percentage points. However, the confidence interval around the two estimates overlap, which suggest that the differences in the effect of the GP score are not statically appreciable.[18]

Education has a large and significant effect on the propensity to screen. When we exploit the first set of instruments, an extra year of education increases the probability of screening for colon cancer by 4.1 percentage points; using the second set of instruments the probability increases by 4.8 points. The average effect of memory recall is positive, even though the size and the significance of the point estimates vary across specifications. Verbal fluency has a positive and significant

[17] Specifically: (1) voluntary or charity work; (2) care for a sick or disabled adult; (3) help for family, friends or neighbours; (4) attendance of an educational or training course; (5) participation in a sport, social or other kind of club; (6) taking part in a religious organization; (7) taking part in a political or community-related organization.

[18] When we instrument the GP quality using both sets of instruments together we find that 1 point increase in the GP score increases the probability of screening for breast cancer by 12 percentage points and the probability of screening for colorectal cancer by 14 percentage points. Both effects are significant at 1 percent level.

effect on the propensity to undergo the test. While the coefficient on education shrinks after controlling for cognitive skills, the marginal effect is still large and significantly different from zero. Consistent with the previous results, higher household income significantly increases the probability of screening for colon cancer.

Limitations in Instrumental Daily Activities have a negative effect on the probability of undertaking colonoscopy. Remarkably, the more individuals are involved in social activities, the more they are likely to take a colonoscopy. Longer waiting time discourages people from testing, but the effect is not significantly different from zero.

§3.4. GP quality and the health-education gradient

In the previous section we document that even after controlling for physicians' quality, education and cognitive abilities have a large and significant effect on the propensity to screen. An extensive literature shows that education increases awareness of unhealthy behaviours and health risks. Schooling reduces smoking, drinking and sedentary life (Kenkel (1990); Kenkel (1991)), affects demand for early detection of breast and cervical cancer (Kenkel (1994)) and flu vaccination (Mullahy (1999)). Another strand of the literature points out that better educated people are quicker to exploit technological advances in medicine and more complex technologies, as discussed in Cutler and Lleras-Muney (2008).

In this section we test the hypothesis that improvements in GP quality tend to affect disparities in health prevention behaviour for elderly with different levels of education. Formally, we estimate the following equation:

$$Pr(Y_i = 1) = \Phi(\beta_0 + \beta_1 GP_i + \beta_2 E_i + \beta_3 GP_i * E_i + \gamma' X_i) \tag{3.2}$$

A positive value of the β_3 coefficient on the interaction term would suggest that education and GP quality are complements; a negative value would imply they are substitutes. To identify the parameter β_3 we need to control for the endogeneity of the interaction term. Therefore, we interact the first stage residuals of the GP quality score with education and the proxies for cognitive skills.[19]

Table 3.7 focuses on mammography. On average, the marginal effect of an extra year of education increases when the GP quality score increases. However, the marginal effect is significant at 10% only when the GP score is instrumented with past conditions. The complementarity is stronger and statistically different

[19] Blundell and Powell (2004) present a semi-parametric version of this estimator.

from zero if we proxy the ability to acquire information with the memory recall score: the marginal effect of the interaction term is 1.85 percentage points in both specifications. Finally we find that the interaction effect between verbal fluency and GP is positive, although not statistically different from zero.

Table 3.8 shows the results for colonoscopy. We find again a strong complementarity between proxies for the ability to acquire information and the GP quality score. Irrespective of whether we instrument the GP quality score by using regional measures of primary care investments or diagnosis of chronic conditions in the past, we find that the marginal effect on the interaction terms are always strongly significant: also in this case the size of the marginal effect is particularly large when the ability to acquire information is proxied by the memory recall score.[20]

The results of Tables 3.7 and 3.8 are consistent with the idea that more educated individuals can take more advantage of higher quality GPs. Better doctors not only provide individuals with better treatments but can give better information about individuals' health risk factors and, more in general, about the functioning of the healthcare system. Therefore, the results can be read as evidence that there is a complementarity between individual ability to acquire information, as measured by formal education and cognitive skills, and the information provided by health professionals in the decision to screen. In particular, the evidence suggests that more educated individuals process better the information received from the GP and is consistent with the productive efficiency hypothesis first introduced by Grossman (1972): other things equal, more schooling increases the productivity of health inputs. A large body of literature has suggested that education might proxy for other individual characteristics that might be correlated with the propensity to screen (see for a review Cutler and Lleras-Muney (2008)). People with more schooling might learn to dislike risk and might choose to self-insure by engaging in more preventive activities, an incentive that might be stronger in the presence of low quality healthcare. In this case, however, we would have found a negative interaction term between GP quality and education.[21]

The propensity to screen might also be correlated also with individual discount rates. While there is evidence of a weak relation between education and discount rate (as shown in Fuchs (1982)), it is not clear why better doctors should matter

[20] The size and the significance level of the marginal effect on the interaction terms when we use both sets of instruments together are perfectly in line with the ones we presented in Tables 3.7 and 3.8. Results are available upon request.

[21] As noted by Cutler and Lleras-Muney (2008), the empirical relation between education and risk aversion appears to be u-shaped and thus not consistent with health gradients: very high and very low education levels are associated with more risk taking.

more for individuals with lower discount rates. Finally, in order to provide support to the fact that our measure of GP quality captures the quality of information provided by health professionals and not other dimensions of healthcare quality, we test whether the effect of education and cognitive skills on the propensity to screen varies with the length of waiting times. Results in Table 3.9 show that the marginal effect of the interaction is never statistically different from zero, and does not display a uniform sign across specifications.[22]

§3.5. Conclusions

Healthcare quality is an important determinant of quality and length of life. While the role of medical advice has been assessed in controlled trials and studies that cover individuals with specific health conditions, there is hardly any evidence on how health professionals' quality can affect the health related behaviour in a population representative sample.

In this paper we study the effect of quality of General Practitioners on the propensity to undertake two widely recommended screening tests, mammography and colonoscopy. Using data from the Survey of Health, Ageing and Retirement we exploit the unique information about the completion of standard and universally recommended geriatric assessments to construct an individual measure of GP quality and study how it relates to screening decisions of individuals aged 50+. Since GPs often represent the first source of medical advice, it is particularly important to assess how their quality can affect the individual attitude towards prevention.

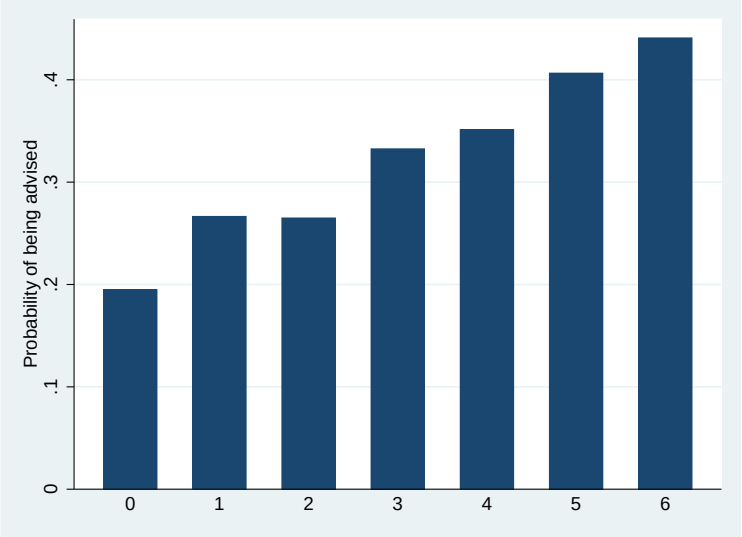
Once we control for the possible endogeneity of the GP quality, we find that better GPs significantly increase the propensity to undertake mammography and colonoscopy among elderly. We also find that the effect of GP quality increases with years of formal schooling and with cognitive abilities. The most likely explanation for this result is that better educated individuals screen more because they are more likely to internalize the information received by their GPs. In a nutshell, while everyone has access to a GP, only the better educated take full advantage of the information provided by the GP.

Our results have two important implications. First, external sources of health-related information and education are at least in part complements in the decision to undertake preventive screening. Second, since information provided by General

[22]We repeat the exercise using the number of beds as measure of healthcare quality and find consistent results. However, regional data for the number of beds are not available for the full sets of regions.

Practitioner does not reduce health disparities, targeted programmes should be designed to increase individual awareness on virtuous health behaviours.

Figure 3.1: Probability of being advised Flu Vaccination by GP Quality



Note: The figure plots the probability of an individual aged 65+ being advised to get a flu vaccination in the year before the survey against the GP score.

Table 3.1: Preventive screening compliance

	Mammography	*Colonoscopy*	
		Women	*Men*
Austria	0.61	0.26	0.25
Germany	0.43	0.25	0.26
Spain	0.53	0.08	0.08
Italy	0.58	0.15	0.13
France	0.73	0.23	0.28
Denmark	0.22	0.14	0.15
Switzerland	0.43	0.2	0.22
Belgium	0.64	0.15	0.15
Total	0.54	0.18	0.19

Note: The table reports the relative frequency by country of mammography and colonoscopy. The sample includes 12,405 men and 15,177 women aged 50-85.

Table 3.2: Quality of General Practitioners

	GP coverage	*GP score distribution*							*Mean*	*Obs*
Austria	0.94	0.17	0.14	0.14	0.16	0.11	0.08	0.2	2.95	1560
Germany	0.94	0.2	0.12	0.16	0.17	0.14	0.1	0.1	2.62	1794
Spain	0.97	0.15	0.12	0.13	0.17	0.15	0.12	0.16	3.03	1500
Italy	0.98	0.25	0.15	0.16	0.15	0.13	0.08	0.09	2.35	1453
France	0.93	0.07	0.12	0.17	0.21	0.2	0.14	0.1	3.18	1137
Denmark	0.97	0.25	0.18	0.17	0.15	0.14	0.07	0.05	2.13	1143
Switzerland	0.91	0.13	0.17	0.15	0.25	0.15	0.09	0.07	2.69	632
Belgium	0.89	0.12	0.14	0.17	0.2	0.18	0.1	0.09	2.84	2382
Total	0.94	0.17	0.14	0.16	0.18	0.15	0.1	0.11	2.74	11601

Note: The table reports GP coverage and the GP score distribution by country. GP coverage is the percentage of individuals who say they have a GP. The GP score ranges 0-6.

Table 3.3: Sample Statistics for selected variables

	Mammography		Colonoscopy	
	Yes	No	Yes	No
Age	63.467	68.114	66.042	64.686
	(8.164)	(9.894)	(8.740)	(9.255)
Partner (Y/N)	0.742	0.605	0.748	0.756
	(0.438)	(0.489)	(0.434)	(0.430)
Female	1	1	0.546	0.56
	(0.000)	(0.000)	(0.498)	(0.496)
Years of Educ.	10.026	9.581	11.184	10.159
	(4.357)	(4.616)	(4.249)	(4.579)
Recall	5.168	4.741	5.028	4.878
	(1.764)	(1.914)	(1.759)	(1.817)
Fluency	19.626	18.039	19.995	19.018
	(6.949)	(7.623)	(7.131)	(7.315)
Kids (Y/N)	0.905	(0.876)	0.897	0.886
	(0.294)	(0.330)	(0.303)	(0.318)
Retired (Y/N)	0.399	0.49	0.593	0.5
	(0.490)	(0.500)	(0.491)	(0.500)
Log Income	10.425	10.23	10.515	10.392
	(1.075)	(1.107)	(1.030)	(1.082)
Social Activities	0.864	0.721	0.932	0.801
	(1.071)	(0.997)	(1.114)	(1.052)
GP Index	2.715	2.61	2.975	2.657
	(1.870)	(1.961)	(1.878)	(1.917)
Regional Waiting Time	1.639	1.898	1.364	1.846
	(2.008)	(2.325)	(1.752)	(2.251)

Note: The table reports the means of the variables used in the estimation; standard deviations in parenthesis.

Table 3.4: First Stage IV Regressions

Dependent Variable: GP Index						
Regional Flu Vacc. Rate	1.2331***	1.2310***	1.2614***			
	(0.427)	(0.423)	(0.426)			
Regional Smoking rate	0.5157	0.4792	0.4739			
	(0.747)	(0.746)	(0.748)			
Arthritis				0.2209***	0.2258***	0.2274***
				(0.050)	(0.050)	(0.050)
Asthma				0.2580**	0.2600**	0.2622**
				(0.105)	(0.105)	(0.105)
Osteoporosis				0.1431*	0.1409*	0.1389*
				(0.082)	(0.082)	(0.082)
Years of Educ.	-0.0066	-0.0017	-0.0042	-0.0037	0.0014	-0.0012
	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)
Log Income	-0.0373	-0.0357	-0.0365	-0.0359	-0.0342	-0.035
	(0.029)	(0.029)	(0.029)	(0.030)	(0.030)	(0.029)
IADL	0.2006***	0.1935***	0.2100***	0.1870***	0.1794***	0.1960***
	(0.032)	(0.033)	(0.034)	(0.031)	(0.031)	(0.033)
Social Activities	-0.0195	-0.015	-0.0166	-0.0222	-0.0175	-0.0192
	(0.028)	(0.028)	(0.029)	(0.028)	(0.028)	(0.029)
Regional Wait Time	-0.0166	-0.0167	-0.018	-0.017	-0.017	-0.0184
	(0.026)	(0.025)	(0.026)	(0.025)	(0.025)	(0.026)
Recall		-0.0450***			-0.0457***	
		(0.016)			(0.016)	
Fluency			-0.0047			-0.0047
			(0.007)			(0.007)
Observations	10973	10933	10915	10973	10933	10915

Note: *** denotes significance at 1%, ** at 5% and * at 10%. The sample includes individuals aged 50-85. Columns 1-3 feature the regional flu vaccination and smoking rates as regressors; columns 4-6 dummies for whether arthritis, asthma and osteoporosis were diagnosed. Additional controls not reported include age, a dummy for the marital status, a dummy for whether the individual has at least one kid, a dummy for whether the individual is retired or not, and gender composition at regional level.

Table 3.5: Compliance with Mammography Test

	Instruments: Flu vaccination and smoking rate			Instruments: past conditions		
GP Index	0.1072**	0.1099**	0.1063*	0.1477*	0.1466**	0.1415**
	(0.050)	(0.055)	(0.060)	(0.081)	(0.070)	(0.065)
Education	0.0088***	0.0067***	0.0076***	0.0091***	0.0069***	0.0078***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log Income	0.0184***	0.0177**	0.0168**	0.0191***	0.0183**	0.0175**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
IADL	-0.0668***	-0.0655***	-0.0677***	-0.0750***	-0.0726***	-0.0753***
	(0.013)	(0.013)	(0.015)	(0.019)	(0.016)	(0.017)
Social Activities	0.0207***	0.0179**	0.0182***	0.0222***	0.0190**	0.0194***
	(0.007)	(0.007)	(0.006)	(0.008)	(0.008)	(0.006)
Regional Wait Time	-0.0070*	-0.0075**	-0.0070**	-0.0068*	-0.0073**	-0.0068*
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Recall		0.0183***			0.0200***	
		(0.005)			(0.005)	
Fluency			0.0024**			0.0025*
			(0.001)			(0.001)
Cragg Donald Rank Stat.	12.906	12.822	13.059	5.836	6.101	6.069
Hansen J Stat.	0.106	0.145	0.172	2.624	2.609	2.789
P value	0.744	0.704	0.678	0.269	0.271	0.248
Observations	5989	5971	5961	5989	5971	5961

Note: *** denotes significance at 1%, ** at 5% and * at 10%. We report marginal effects of each variable, with standard errors in parenthesis. In columns 1-3 the exclusion restrictions are the flu vaccination rate and the smoking rate calculated at regional level. In columns 4-6 the exclusion restrictions are dummies for whether arthritis, asthma and osteoporosis were diagnosed. Marginal effects are calculated as average partial effects following the procedure suggested by Wooldridge (2002). Standard errors are calculated with 150 bootstrap repetitions. Additional controls not reported include age, a dummy for the marital status, a dummy for whether the individual has at least one kid, a dummy for whether the individual is retired or not, and gender composition at regional level. The regressions for colonoscopy also control for a gender dummy.

Table 3.6: Compliance with Colonoscopy Test

	Instruments: Flu vaccination and smoking rate			Instruments: past conditions		
GP Index	0.0784**	0.0799**	0.0769**	0.2066***	0.2059***	0.2050***
	(0.035)	(0.040)	(0.036)	(0.054)	(0.050)	(0.045)
Education	0.0041***	0.0038***	0.0037***	0.0048***	0.0037**	0.0041***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Log Income	0.0140***	0.0136***	0.0131***	0.0186***	0.0179***	0.0177***
	(0.004)	(0.005)	(0.004)	(0.006)	(0.006)	(0.006)
IADL	-0.0013	-0.0001	-0.0013	-0.0280**	-0.0253*	-0.0294**
	(0.009)	(0.010)	(0.009)	(0.014)	(0.013)	(0.013)
Social Activities	0.0142***	0.0137***	0.0132***	0.0174***	0.0162***	0.0161***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.005)
Regional Wait Time	-0.0034	-0.0036	-0.0033	-0.0011	-0.0013	-0.0008
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Recall		0.0043			0.0105***	
		(0.003)			(0.004)	
Fluency			0.0011*			0.0017**
			(0.001)			(0.001)
Cragg Donald Rank Stat.	6.069	17.82	18.555	12.183	12.552	12.632
Hansen J Stat.	0.666	0.644	0.493	2.762	2.854	2.888
P value	0.415	0.422	0.483	0.251	0.24	0.236
Observations	10551	10512	10494	10551	10512	10494

Note: *** denotes significance at 1%, ** at 5% and * at 10%. We report marginal effects of each variable, with standard errors in parenthesis. In columns 1-3 the exclusion restrictions are the flu vaccination rate and the smoking rate calculated at regional level. In columns 4-6 the exclusion restrictions are dummies for whether arthritis, asthma and osteoporosis were diagnosed. Marginal effects are calculated as average partial effects following the procedure suggested by Wooldridge (2002). Standard errors are calculated with 150 bootstrap repetitions. Additional controls not reported include age, a dummy for the marital status, a dummy for whether the individual has at least one kid, a dummy for whether the individual is retired or not, and gender composition at regional level. The regressions for colonoscopy also control for a gender dummy.

Table 3.7: GP Quality and the Education Gradient in Mammography Compliance

	Instruments: Flu vaccination and smoking rate			Instruments: past conditions		
GP Index	0.1026**	0.1050*	0.1113*	0.1496*	0.1560**	0.1587**
	(0.049)	(0.054)	(0.060)	(0.081)	(0.072)	(0.067)
Education	0.0084***	0.0066***	0.0074***	0.0087***	0.0071***	0.0080***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log Income	0.0188***	0.0179**	0.0169**	0.0198***	0.0186**	0.0176**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
IADL	-0.0627***	-0.0561***	-0.0638***	-0.0715***	-0.0658***	-0.0724***
	(0.013)	(0.014)	(0.014)	(0.020)	(0.016)	(0.017)
Social Activities	0.0214***	0.0185***	0.0185***	0.0232***	0.0202***	0.0202***
	(0.007)	(0.007)	(0.006)	(0.008)	(0.008)	(0.007)
Regional Wait Time	-0.0070*	-0.0089**	-0.0072**	-0.0067*	-0.0089**	-0.0084**
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Recall		0.0174***			0.0201***	
		(0.005)			(0.005)	
Fluency			0.0028**			0.0029**
			(0.001)			(0.001)
GP Ind.*Edu	0.0047			0.0052*		
	(0.003)			(0.003)		
GP Ind.*Recall		0.0187***			0.0186***	
		(0.007)			(0.007)	
GP Ind.*Fluency			0.0022			0.0031
			(0.002)			(0.002)
Observations	5989	5971	5961	5989	5971	5961

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are clustered at regional level. We report marginal effects of each variable, with standard errors in parenthesis. In columns 1-3 the exclusion restrictions are the flu vaccination rate and the smoking rate calculated at regional level. In columns 4-6 the exclusion restrictions are dummies for whether arthritis, asthma and osteoporosis were diagnosed. Marginal effects are calculated as average partial effects following the procedure suggested by Wooldridge (2002). Marginal effects on the interaction terms are computed following hortciteNAi. Standard errors are calculated with 150 bootstrap repetitions. Additional controls not reported include age, a dummy for the marital status, a dummy for whether the individual has at least one kid, a dummy for whether the individual is retired or not, and gender composition at regional level. The regressions for colonoscopy also control for a gender dummy.

Table 3.8: GP Quality and the Education Gradient in Colonoscopy Compliance

	Instruments: Flu vaccination and smoking rate			Instruments: past conditions		
GP Index	0.0752**	0.0807**	0.0823**	0.2145***	0.2075***	0.2089***
	(0.035)	(0.041)	(0.038)	(0.054)	(0.050)	(0.044)
Education	0.0037***	0.0037***	0.0036***	0.0043***	0.0038***	0.0040***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Log Income	0.0146***	0.0138***	0.0135***	0.0199***	0.0183***	0.0183***
	(0.004)	(0.005)	(0.004)	(0.006)	(0.006)	(0.006)
IADL	0.0027	0.0035	0.0051	-0.0260*	-0.0219	-0.0225*
	(0.009)	(0.010)	(0.010)	(0.014)	(0.014)	(0.013)
Social Activities	0.0149***	0.0138***	0.0134***	0.0184***	0.0164***	0.0162***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.005)
Regional Wait Time	-0.0036	-0.004	-0.004	-0.0007	-0.0011	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Recall		0.004			0.0103**	
		(0.003)			(0.004)	
Fluency			0.0012*			0.0019**
			(0.001)			(0.001)
GP Ind.*Education	0.0067***			0.0092***		
	(0.002)			(0.002)		
GP Ind*Education		0.0090**			0.0147***	
		(0.004)			(0.005)	
GP Ind.*Fluency			0.0045***			0.0057***
			(0.001)			(0.001)
Observations	10551	10512	10494	10551	10512	10494

Note: *** denotes significance at 1%, ** at 5% and * at 10%. We report marginal effects of each variable, with standard errors in parenthesis. In columns 1-3 the exclusion restrictions are the flu vaccination rate and the smoking rate calculated at regional level. In columns 4-6 the exclusion restrictions are dummies for whether arthritis, asthma and osteoporosis were diagnosed. Marginal effects are calculated as average partial effects following the procedure suggested by Wooldridge (2002). Marginal effects on the interaction terms are computed following hortciteNAi. Standard errors are calculated with 150 bootstrap repetitions. Additional controls not reported include age, a dummy for the marital status, a dummy for whether the individual has at least one kid, a dummy for whether the individual is retired or not, and gender composition at regional level. The regressions for colonoscopy also control for a gender dummy.

Table 3.9: The Education Gradient and other measures of healthcare quality

	Mammography			Colonscopy		
Regional Wait. Time	-0.0098	-0.0092	-0.0081	-0.0047	-0.0045	-0.0043
	(0.008)	(0.007)	(0.007)	(0.003)	(0.004)	(0.004)
Education	0.0087***	0.0084***	0.009***	0.0038***	0.0038***	0.0037***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Log Income	0.022***	0.0185***	0.0177***	0.0108***	0.0105***	0.0101**
	(0.008)	(0.008)	(0.007)	(0.004)	(0.004)	(0.004)
IADL	-0.044***	-0.0428***	-0.0435***	0.015***	0.0162***	0.0158***
	(0.009)	(0.008)	(0.008)	(0.005)	(0.005)	(0.005)
Social Activities	0.0164**	0.0147**	0.0152**	0.0129***	0.0128***	0.0121***
	(0.006)	(0.007)	(0.007)	(0.003)	(0.003)	(0.003)
Recall		0.0122***			0.0008	
		(0.003)			(0.002)	
Fluency			0.0016			0.0008
			(0.001)			(0.001)
Regional Wait. Time*Educ.	-0.0013			0.0001		
	(0.001)			(0.001)		
Regional Wait. Time*Recall		-0.0026			0.0017*	
		(0.002)			(0.001)	
Regional Wait. Time*Fluency			0			0.0002
			(0.001)			(0.000)
Observations	6428	6408	6398	11363	11321	11362

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are clustered at regional level. We report marginal effects of each variable, with standard errors in parenthesis. In columns 1-3 the exclusion restrictions are the flu vaccination rate and the smoking rate calculated at regional level. In columns 4-6 the exclusion restrictions are dummies for whether arthritis, asthma and osteoporosis were diagnosed. Marginal effects are calculated as average partial effects following the procedure suggested by Wooldridge (2002). Marginal effects on the interaction terms are computed following hortciteNAi. Additional controls not reported include age, a dummy for the marital status, a dummy for whether the individual has at least one kid, a dummy for whether the individual is retired or not, and gender composition at regional level.

CHAPTER 4

Health Insurance in Europe: The Role of Health Information

We use microdata from the Survey of Health, Ageing and Retirement in Europe to study the presence of asymmetric information in the market for private hospital insurance among individuals aged 50+ in eight European countries. We find evidence of advantageous selection and we document the role of education and cognitive skills as important sources. Finally, we provide suggestive evidence that the ability to acquire health information is one of the relevant pathways.

§4.1. Introduction

In most European countries the government is the main provider and source of funding for healthcare. However, a variety of macroeconomic factors (especially ageing population) are causing dramatic reduction in public healthcare benefits, starting from the late 1980s. As a consequence, in many countries there has been a dramatic increase in the share of out-of-pocket health expenditure. European country governments have tried to boost the take up of voluntary private health insurance (VPHI) to complement or supplement public healthcare, by introducing tax incentives. However, the evidence suggests that the effect has been negligible.[1] Private insurance coverage in Europe on average is low and varies dramatically across countries. To our knowledge, there is no evidence on whether and to what extent asymmetric information in the insurance markets can explain this large geographic variation. We use individual data from the first two waves of the Survey of Health, Ageing and Retirement (SHARE) to test for the presence

[1] See Emmerson et al. (2001) for the UK and Rodriguez and Stoyanova (2008) for Spain.

of asymmetric information in the market for private hospital insurance coverage among individuals aged 50-75 in eight European countries.[2]

In the classic adverse selection models (Rothschild and Stiglitz (1976) and Wilson (1977)) potential insurance buyers are assumed to have one-dimensional private information regarding their risk type. These models predict a positive correlation between insurance coverage and ex post realization of loss:[3] "high risk" individuals are more likely to have an incentive to buy insurance. Ex post moral hazard strengthens the positive correlation between coverage and ex post loss. The "positive correlation property" of classic information models has been tested in several recent studies producing results that are mixed and differ by markets.[4] Based on these results, both theoretical and empirical studies have explored the possibility that multidimensional private information can lead to what has been defined as "advantageous selection". On the theoretical side, de Meza and Webb (2001) postulate that individuals have private information both about their risk type and their attitude towards risk. They argue that selection based on risk attitude is advantageous in the sense that more risk averse individuals are both more likely to buy insurance and less likely to incur in future losses. Therefore, the failure to condition on risk aversion can mask the positive correlation between insurance coverage and ex post loss predicted by one-dimensional models of asymmetric information. Finkelstein and McGarry (2006) provide empirical support for the result in de Meza and Webb (2001) when studying the long term care (LTC) insurance market in the US. Their findings suggest that individuals who are more risk averse are more likely to own LTC insurance and less likely to enter a nursing home.[5] However, as stressed by Fang et al. (2008), risk preference is only one of the potential sources of private information that can lead to advantageous selection. They find evidence of strong advantageous selection in the Medigap insurance market and they point at, among others, education and cog-

[2]The SHARE data collection has been primarily funded by the European Commission through the 5th framework program (project QLK6-CT-2001-00360 in the thematic program Quality of Life). Additional funding came from the US National Institute on Ageing (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01 and OGHA 04-064). Data collection in Austria (through the Austrian Science Foundation, FWF), Belgium (through the Belgian Science Policy Administration) and Switzerland (through BBW/OFES/UFES) was nationally funded. The SHARE data set is presented in Börsch-Supan et al. (2005).

[3]Chiappori et al. (2006) generalize this empirical prediction to a larger class of models.

[4]Chiappori and Salanie (2001) perform the positive correlation test for the car insurance market in France. Chiappori (2000) provides an extensive survey of the theoretical and empirical literature. See Cutler and Zeckhauser (2000) for a review of the applications in the health insurance market.

[5]Cutler et al. (2008) provide evidence on the role of risk aversion in other insurance markets.

nitive skills as prominent sources. They do not find instead that risk preferences are particularly important.

The objective of this work is to assess whether asymmetric information can undermine the efficient operation of the private hospital insurance market in Europe and to examine the role of education and cognitive skills as potential sources of advantageous selection. Existing evidence suggests that more educated individuals are more likely to undertake health prevention activities (Mullahy (1999) and Kenkel (1994)) and less likely to engage in risky behaviors (Kenkel and Terza (2001)), thus reducing the potential need for hospital treatment. At the same time education (cognitive ability) is positively and strongly correlated with the probability of signing a private health insurance (see Paccagnella et al. (2008) and Propper et al. (2001)). Since insurance companies in Europe are not allowed to collect information either on education or cognitive ability, these variables might act as sources of private information and contribute to offset the positive correlation between insurance coverage and ex post realization of loss. In the attempt to provide explanations for the role of education and cognitive skills as sources of advantageous selection, we test the hypothesis that better educated and more cognitive able individuals buy more health insurance because they have a lower cost of acquiring health related information.

In most European countries basic hospital services are provided free of charge under the statutory health insurance and hospital care is the major component of healthcare expenditure (around 40%). Private hospital insurance - defined as the coverage that gives individuals an extended choice of hospitals (and clinics) for hospital care, and/or full cover for the costs of hospital care - is by far the most common type of private health insurance among the individuals in our sample: coverage rate is 17% as opposed to 5% coverage for insurances that allows extended choice of doctors and specialists, and less than 1% coverage for long term care in either a nursing home or the individual's own home.

Health insurance markets are strictly regulated in all the EU countries covered by our analysis and, since the introduction of the third non-life insurance directive in 1992, there has been an increasing harmonization of rules. The standardization of hospital insurance contracts makes this market suitable for investigating the presence of multidimensional private information. In fact the theoretical findings in Chiappori et al. (2006) suggest that, in order for multidimensional private information to manifest itself as a violation of the positive correlation property, insurance companies should not be free to offer any insurance contract they choose. There are at least two advantages in using SHARE to study the presence of

multidimensional private information in the hospital insurance market in Europe. First, we can exploit the panel dimension of the dataset to construct an individual measure of ex post realization of loss, as defined by the probability of spending at least one night in hospital in the 12 months before the second wave interview. Second, SHARE collects extremely rich and detailed information on individual's past and current health as well as standard demographics. This allows us to replicate the information set used by the insurers to price insurance policies.

The strategy we follow in this paper to study the presence of asymmetric information in the private hospital insurance market in eight European countries is closely related to the one adopted by Finkelstein and McGarry (2006) in their analysis of the LTC market in the US. Initially, we test whether, conditional on insurers' assessments of a person's risk type, there is a statistically significant correlation between private hospital insurance coverage as recorded in the 2004 wave and the ex post probability of entering hospital. We fail to detect any statistically significant correlation. This result is consistent both with "no asymmetric information" and with "multidimensional private information". In contrast with the first explanation, we find that a subjective assessment of survival probability contained in the 2004 questionnaire is positively correlated with the probability of hospital insurance coverage and negatively correlated with the ex post loss. However, even after controlling for subjective survival probability, there is no evidence of positive correlation between insurance coverage and ex post risk of hospitalization. Since the subjective assessment of survival probability is not observed by the insurers, this result supports the existence of multidimensional private information that leads to advantageous selection. We then study the role of education and cognitive skills as potential sources of advantageous selection.

In order to shed light on the mechanisms that explain this advantageous selection, we test whether more educated and cognitive able individuals buy more insurance because they are more likely to be informed about health related issues. First, we use data from the Eurobarometer "EU citizens and sources of information about health" (2002) to provide evidence that better educated individuals are more likely to substitute health professionals with informal sources (the Internet, newspapers, television) when looking for health related information. We then exploit within country variations in the quality of health promotion to document that years of education and cognitive skills both act as substitutes for (proxies for) quality of health promotion at regional level. On average one standard deviation increase in the scores for recall ability tests is associated with an increase of 1.6 percentage points in the probability of signing private hospital insurance.

However, the effect is 1.2 percentage points higher in regions with low quality health promotion compared to those with high quality.

To our knowledge, this is the first study that tests for asymmetric information at cross country level and it provides two main contributions. First, it contributes to the literature on the different dimensions of individuals' unobservable characteristics which affect the decision to purchase a health insurance. Second, this analysis has important policy implications for the organization of healthcare systems in Europe. While tax incentives have proved to be not very effective in boosting private insurance take up, government might invest more resources in health information programmes. Our results can be read as evidence that these programmes can contribute to reducing health inequalities. Therefore, when evaluating their benefits/costs, governments should explicitly take account of their indirect effects on private insurance take up.

The paper is organized as follows. In Section 4.2 we provide some background on the data and on the institutional context of private health insurance in the selected EU countries. Section 4.3 provides descriptive evidence and outlines the empirical strategy. Section 4.4 presents the findings and Section 4.5 concludes.

§4.2. Background

4.2.1 — Data

As main data source, we draw on information from the two waves of SHARE, which surveyed the 50+ population, in 2004 and 2006. This survey is multidisciplinary and uses a cross-sectional panel database with a wide range of topics, including physical health, socioeconomic status, income and intensity of social interaction. Some questions refer to households (e.g. income), others are addressed to all eligible members within a household and their partners: for instance, indicators of health status and behaviour. SHARE also includes a section with questions on preferences, beliefs, attitudes and other items. There are detailed questions about the purchase and type of health insurance, and health related out-of-pocket expenditures. The first wave of the survey covered more than 30,000 individuals in 11 countries. Data from the second wave are still preliminary for some countries. Of the original 11 countries covered by SHARE, we exploit data on 8 for the econometric analysis. We exclude Switzerland and France since it is not possible to follow most individuals over time, due to the provisional version of the second

wave data.[6] We also exclude the Netherlands because of the institutional features of that country's healthcare system and the recent reform in the statutory healthcare system. Until January 2006, Dutch healthcare combined Social Health Insurance (SHI), which guaranteed basic insurance cover for low-income earners, with a Private Health Insurance (PHI) scheme for high earners who could opt out of SHI. As result, only 72% of the Dutch population was covered by the statutory health insurance (the average for the other countries is above 90%). The 2006 Healthcare Act scrapped the division between SHI and PHI and introduced a single insurance regime.

With the exception only of Germany and Austria, contracts for elderly people are usually on an annual basis and individuals aged over 75 are not able to buy private hospital insurance. Our final sample includes 5,676 males and 6,597 females in Austria, Belgium, Denmark, Germany, Greece, Italy, Spain and Sweden, aged between 50 and 75.

We also rely on an auxiliary data source, the Eurobarometer "EU citizens and sources of information about health" (2002). Since 1973, the European Commission has been monitoring the evolution of public opinion in the Member States by running the Eurobarometer Surveys. In 2002, 17,041 individuals in fifteen European countries have been addressed a variety of questions about their main health information source, the number of different sources they rely on and how much they trust them. A limited number of demographic characteristics are reported as well: gender, age, marital status, professional status, age of completion of schooling. We restrict the sample to all individuals older than 20 and younger than 80 in the 8 European countries covered by our main analysis.

4.2.2 — Institutional Setting

This section provides some basic detail on the regulatory framework of private health insurance in selected countries. There are different types of VPHI, but they can be classified into three major types according to how they integrate the public system: *duplicate*, *complement* and *supplement*. We do not study the determinants of *duplicate* coverage in this work. *Complementary* private insurance provides full or partial cover for services that are excluded or not fully covered by the statutory healthcare system. It is available for the whole population, albeit in different forms, in all the countries in our analysis. *Supplementary* health insurance serves to increase consumer choice and access to different health services,

[6] Moreover, the regulatory framework of the health insurance market in Switzerland differs substantially from those in the remaining countries.

guaranteeing faster access to treatment and increasing the quality of accommodation and amenities. In most cases, *supplementary* private insurances increases the choice of provider and benefits. Individuals with *supplementary* insurance may be treated in private hospitals, buy private treatment in public hospitals, or receive benefits in cash rather than in kind. *Supplementary* insurance sometimes is described as "double coverage".

In most European countries there is universal basic coverage, but there are a few exceptions. In Germany about 9% of the population is covered by primary private insurance (the self-employed who are excluded from the social security system, employees above an income threshold who opt for private insurance, and public employees, for the portion of health care expenditure not directly reimbursed by the government). Similarly, in Belgium, Spain and Austria there are small percentages of the population (mainly comprising self-employed and civil servants) who are not covered by primary health insurance.

We now describe the methods used to set private insurance premiums and the variables used in risk ratings as these are essential for the "positive correlation" test presented in the next section. Risk rating is the method most commonly used by insurers in the EU to set prices for complementary and supplementary VPHI. It is used to varying degrees and for different types of VPHI in all the countries in this analysis. Table 4.1 provides examples of the variables used to set premiums. These include age, sex, occupation, household size, medical history, family history. Group rating is used in Denmark, Greece, Italy and Sweden mainly for group policies. In Belgium mutual associations can sell policies with flat rate premiums, but these are not widespread. Insurers that use health status as a variable in risk rating premiums require applicants to complete a medical questionnaire. This questionnaire can include questions about a family's history of disease.[7] The use of medical examinations to set premiums is not very common in the countries analysed.[8]

Tax incentives are in place in most countries in our sample with some important differences. In Denmark and Spain there are no deductions for employees, but firms can deduct employer based premiums from tax. In Germany, Greece, Italy and Sweden there are tax provisions for individuals, but not for employers.

There is no systematic evidence on the market structure of private health insurance across EU countries. In 2005, Italy and Spain had the highest number of

[7] According to Mossialos and Thomson (2004) family history of disease is required only in Greece.

[8] While Austria explicitly forbids insurers to conduct medical examinations, in Belgium they are common practice for commercial policies.

health insurance companies (respectively 93 and 87) and Austria and Sweden had the lowest (respectively 7 and 6). Mossialos and Thomson (2004) collecting data from different sources find evidence that market concentration, measured by the market shares of the three largest insurers, is particularly high in Austria (84%), Sweden (80-90%) and Greece (70.4%). Concentration rates are much smaller in Belgium (49%) and Italy (33%). Data on the administrative costs of voluntary health insurers are limited, although the available evidence suggests that these costs are high compared to those in the statutory healthcare system. Voluntary health insurers' administrative costs range between 10 per cent in Germany to as high as 25 per cent in Austria, Belgium and Italy.

§4.3. Empirical Analysis

4.3.1 — Descriptives

Figure 4.1 shows the proportion of individuals aged 50-75 covered by private hospital insurance. Belgium and Austria are the countries with the highest take up, while Italy, Sweden and Greece have the lowest. The high coverage in Belgium is partly due to the special regime for the self-employed, which accounts for about 6% of the total population in this older age group. The statutory health insurance scheme does not cover self-employed people for 'minor risks', which include minor operations.[9]

In order to define the individual accident probability, we use the following question: "During the last 12 months have you been in a hospital over night?". Figure 4.2 plots the average probability of being in hospital overnight in the 12 months before the 2006 interviews of subjects interviewed in the 2004 wave. Countries where the percentage of the population covered by private insurance is higher on average display a higher average probability of entering hospital. However, while in Austria the probability is much higher for those covered by private hospital insurance, in Belgium and Germany the probability is slightly higher for those not covered by insurance. Among individuals living in low insurance coverage countries the risk of entering hospital is much higher for those not covered by hospital insurance. The difference between insured and not insured is particularly striking in Italy and Sweden, providing evidence of some advantageous selection.

In order to measure whether individuals have residual private information with respect to the risk assessment exercises performed by insurance companies, we

[9]However, the hospital insurance coverage does not vary significantly between self-employed and employed people in Belgium.

use the self assessed survival probability. In SHARE 2004 the question is worded: "What are the chances that you will live to be age T or more?". The target age, T, contained in this question was chosen conditional on the respondent's age, and the distance between current age and target age varied from 10 to 24 years.[10] Guiso et al. (2005) provide evidence based on SHARE that up to age 60, respondents' subjective survival probabilities and their life-table counterparts correspond very well for males but that females tend to underestimate their survival rates. For older people, especially males, there is some evidence of overstatement relative to the life tables.

One well-known problem with self reported probabilities is the propensity of respondents to report round figures such as 0,50, 100 (see Hurd and McGarry (1995) and Gan et al. (2005)). As emphasized in Finkelstein and McGarry (2006), if individuals use probabilistic information in their decision to buy insurance, but are unable to translate their latent probability into numbers, the estimates are likely to be underestimates of the extent of individual information. Figure 4.3 plots the self-assessed probability of being alive at age 75 for individuals aged 50-65 in the 2004 wave. Among women, Danish and Swedish are the ones with the highest subjective survival probability, while Greek and Belgian display the lowest values. Danish and Italian men are the ones who expect to live longer, Greek and Belgian men shorter

Finkelstein and McGarry (2006) and Cutler et al. (2008) stress the role of risk aversion as the explanation for rejection of the "positive correlation" test exploiting proxies for risk aversion based on the completion of standardard preventive tests. Fang et al. (2008) using direct measures of risk aversion elicited in the Health and Retirement Survey (HRS) do not find that risk preferences have a significant role in explaining advantageous selection in the Medigap insurance market. Since the 2004 SHARE survey does not contain any question about risk attitude, we can not directly test whether risk preference represents a potential source of private information. However, the 2006 wave of SHARE elicited information on risk aversion. Individuals were asked to choose, from four statements, which was closest to the level of financial risk they would be willing to undertake over savings or making an investment.[11] Figure 4.4 displays the distribution of this measure of risk aversion for individuals aged 50-75 by country of residence.

[10] E.g. for individuals in the age group 51-55 the target age is 75; for individuals in the age group 71-75 the target age is 85.

[11] The statements are: 1) Take substantial financial risks expecting to earn substantial returns; 2) Take above average financial risks expecting to earn above average returns; 3) Take average financial risks expecting to earn average returns; 4) Not willing to take any financial risks.

While there are differences across countries, there is no systematic evidence that individuals in countries with higher insurance coverage are on average more risk averse.

Table 4.2 reports how average years of education and cognitive abilities vary across countries. Germans and Austrians, on average, are the best educated (respectively with 13.8 and 13.3 years of education). In order to construct the memory indicator, respondents were shown a list of ten words and then asked to recall them. The indicator is constructed by counting the number of words recalled, and ranges from 0, in the case that a respondent was not able to remember even one word, to 10. In the rest of the paper, we use the terminology from the cognitive psychology literature and refer to this indicator as memory recall, or simply recall. Recall scores are highest for Denmark and Germany (respectively 5.8 and 5.6). Executive function is measured by asking the respondent to name as many animals as possible in exactly one minute. Each respondent is given a score, which is equal to the number of animals that she or he is able to name. We refer to this indicator as verbal fluency, or simply fluency. The fluency score, defined over the range 0-100, peaks for Sweden and Austria (respectively 24.4 and 22.7), with the lowest values for Italy, Spain and Greece (all below 16). Recall and fluency are commonly regarded as proxying for the ability to acquire information.

The indicator for numeracy measures the ability to perform basic numerical operations. SHARE respondents were asked to perform the following simple calculations: (1) find 10 percent of a number; (2) find one half of a number; (3) find the number for which another known number represents two thirds; (4) find 10 percent of another number. Each of the questions refers to a specific economic or financial situation. On the basis of these four questions we constructed a numeracy indicator, which ranges from 1 to 5.[12] The numeracy indicator varies between 1 and 5 and the highest values are for Sweden and Germany (both around 3.8).

4.3.2 — Empirical Method

In order to test for the presence of asymmetric information in the hospital insurance market in eight European countries, we take two steps. First, we perform the "positive correlation" test introduced by Chiappori and Salanie (2001). For this purpose we estimate the following bivariate probit:

[12] The same indicator is used by Christelis et al. (2005).

$$Prob(Hosp = 1) = \Phi(\mathbf{X}'\beta_1) \quad (4.1)$$

$$Prob(HIns = 1) = \Phi(\mathbf{X}'\beta_2) \quad (4.2)$$

where $Hosp$ is a binary variable that takes the value 1 if the individual has spent at least one night in hospital in the 12 months preceding the 2006 interview. $HIns$ is binary variable that takes the value 1 if the individual had hospital insurance cover in 2004. $\mathbf{X}$ is a vector of the covariates to control for the risk classification that would be assigned to an individual by an insurance company in 2004. All the regressions control for country fixed effects.

Following Chiappori and Salanie (2001), the key parameter is the correlation between the error terms in equations (4.1) and (4.2). A unidimensional model of asymmetric information where individuals only have private information about their risk type predicts that the residuals of the two equations are positively correlated (ρ>0).[13] The failure to reject the null hypothesis, $\rho = 0$, is consistent both with lack of asymmetric information and the presence of multiple sources of private information, that can eventually offset the positive correlation between insurance coverage and ex post loss.

Therefore, in order to discriminate between these two alternative explanations, we test whether individuals have *residual* private information on insurance determinants other than their risk type. For this purpose, we follow the strategy adopted by Finkelstein and McGarry (2006) and we augment the model in equations (4.1) and (4.2) by including individual self reported survival probability as elicited from the 2004 wave of SHARE. Finkelstein and McGarry (2006) use the self reported probability of nursing home use 5 years in the future to test for the presence of asymmetric information in the LTC market in the US. Hurd and McGarry (2002), using panel data from HRS, provide evidence that survival probability changes in response to health shocks and it is a very good predictor of actual mortality. Since it is unlikely that insurance companies have information about individual survival probability, we interpret this variable as a proxy for individual information about health status and, thus, the chance of needing hospital treatment. If the survival probability is significantly correlated both with the probability of being covered by a hospital insurance and the ex post proba-

[13] A second approach proposed by Finkelstein and Poterba (2004) consists of estimating a probit for accident risk as a function of private insurance cover, controlling for risk classification. The results of this alternative approach are not presented here, but are consistent with those that are.

bility of entering hospital, there are two possible scenarios. On the one hand, if ρ is positive and statistically significant it might be concluded that individuals have private information on their own risk type. On the other hand, failure to reject the null hypothesis, $\rho = 0$, automatically points to the existence of other sources of unobserved heterogeneity which offset the positive correlation between insurance cover and risk occurrence.

The validity of our private information test relies on the ability to condition on the risk classification of the individual by insurance companies. Using information in Mossialos and Thomson (2004) and from insurance applications to numerous insurance companies, we can determine which are the individual characteristics that insurance companies observe when setting the price of a hospital insurance policy. As mentioned in the previous section, all companies collect a set of demographic characteristics - age, sex, marital status, age of the partner, employment status, area of residence - as well as detailed information on current and past health. The same information is gathered by SHARE, whose data on current health and medical history are extremely rich and detailed. Therefore, we can replicate insurers' information. Finkelstein and McGarry (2006) proposes two alternative methods to control for insurers' risk classification. The first consists of the actuarial prediction of individuals' risk types, because this is the measure used to generate the insurance premium.

In this paper we use the alternative "application information" approach since we do not have information on the actuarial model used by insurers. In this specification we attempt to control for all the aspects that insurance companies might observe about an individual as recorded in the 2004 wave. We include a full set of single year age dummies, all the demographic information that insurance companies collect in their applications (sex, marital status, age of spouse, household size, occupational status, residence in a metropolitan area) and indicator variables for each of the detailed current and past health characteristics. These indicator variables include: dummies for whether the individual has one (two or more) limitation in activities of daily living (ADL), dummies for whether the individual has one (two or more) limitation in instrumental activities of daily living (IADL); low body mass index; high body mass index; a smoker or not; incidence of depression in the previous four weeks; subject to diabetes, hypertension, cholesterol, arthritis, asthma; history of stroke, cancer, heart attack, lung disease; medication for a heart condition, high blood pressure, diabetes; consultation in the previous 12 months with a GP, a specialist. To be conservative, we also control for household income and wealth terciles, although from our research it emerged that few in-

surance companies would ask individuals to classify themselves as high, medium or low income. In many EU countries health insurance is partly or completely subsidized by employers as part of the benefits scheme. Therefore, conditional on the same risk classification, the effective price might vary considerably. In order to control for this possibility, we include a dummy variable that takes value 1 if the health insurance coverage is entirely paid by the insuree, 0 otherwise.

§4.4. Results

4.4.1 — Baseline results

The standard test for asymmetric information, based on a positive correlation between insurance cover and risk occurrence conditional on insurance companies' risk classification, has been applied across a variety of insurance markets with differing results. In the case of health insurance, Cutler and Zeckhauser (2000) review an extensive literature and find mixed evidence.

Table 4.3 shows the results of this standard test, for the hospital insurance market, for eight European countries. Column 1 presents the correlation of the residuals estimated from the bivariate probit in equations (4.1) and (4.2) for the basic specification (*Baseline*), that controls for the variables as described in the previous section. The correlation coefficient is positive, very small and not significantly different from zero. In spite of the increasing effort to harmonize pricing rules across countries, there are still many differences in the way how prices are set and the role of the classification variable might change. Ideally, we would like to allow all the classification variables to simultaneously interact with the country dummies. However, this would make the Maximum Likelihood estimation of the bivariate probit particularly problematic due to the high number of parameters. For this reason we estimate different specifications where different subsets of the control variables are allowed to interact with the country dummies. The importance of sex and occupational status as classification variables change with the type of coverage (individual or group). Group policies are more common in certain EU countries than others. In Belgium higher charges for commercial insurances are applied to people living in the Brussels area. The same happens in Italy with individuals living in metropolitan areas. In the second specification (*Inter I*), we allow the gender dummy, the dummies for the occupational status (civil servant, self employed and retired), and the dummy for living in a metropolitan area to interact with the country dummies. The results are shown in Column 2 of Table 4.3. Also in this case the correlation coefficient ρ is positive, very small and not

significantly different from zero.

In most countries the insurance policy has to be renewed every twelve months. This is not the case in Austria and Germany where contracts can last longer. Therefore, in these two countries it is the age at the entry of the insurance scheme that matters for the price of the coverage. In order to account for age affects that vary across countries, in the third specification (*Inter II*) we allow the single age dummies to interact with the country dummies. In this case the correlation coefficient is negative, but very small and not significantly different from zero. As we already mentioned above, in certain countries insurers are prohibited by law from carrying out medical examinations. This might determine differences on how past health shocks contribute to determine the insurance premium. In column 4 we present the results for the model where we allow the dummies that control for the number of limitations in activities of daily living and in instrumental activities of daily living, for smoking or not, for being obese or not to interact with country dummies (*Inter III*). The correlation coefficient is positive, very small but not significantly different from zero.

In summary, after conditioning for a large set of variables used by the insurance companies to set the price, we can not reject the the null hypothesis of zero correlation between the unobserved characteristics of the decision to purchase a private hospital insurance and the ex post probability of entering hospital. In the textbook adverse selection models, where individuals have only private information about their risk type, this result would imply that there is no asymmetric information. On the other hand, if other sources of private information are allowed, failure to reject the null hypothesis does not rule out the existence of asymmetric information.

We augment the model in equations (4.1) and (4.2) by including the self reported survival probability. Columns 1 and 2 in Table 4.4 report the results for the bivariate probit model for the basic specification. We find that, after controlling for the insurers' risk classification, the survival probability is negatively and significantly correlated with the probability of an overnight stay in hospital in the succeeding 2 years. The survival probability is positively, and significantly correlated with the probability of signing a private hospital insurance. Nevertheless, the correlation coefficient for the residuals of the two equations is not significantly different from zero.

Reassuringly, the results do not change when we allow for interactions of the classification variables with the country dummies: the marginal effects of the survival probabilities both on the probability of purchasing a private hospital

insurance and the probability of requiring hospital treatment are in line with those presented in columns 1 and 2. The correlation coefficient between the residual terms in the two equations is never statically significant, irrespective of the subset of control variables we interact with the country dummies.

In a few countries insurance companies are allowed to collect information on the family history of certain diseases. While this information is not available in SHARE, we repeat the exercises performed above controlling for whether parents are still living and, if not, at what age they died. The results not shown are in line with those presented above.

4.4.2 — Sources of Advantageous Selection

The results in the previous section suggest the existence of individual unobserved characteristics that offset the positive correlation between insurance coverage and ex post risk of entering hospital. These factors, that have to be omitted from the pricing formulas of insurance companies, need to be positively correlated with insurance coverage and negatively correlated with the ex post probability of a hospital overnight stay. In this section we turn our attention on some of these factors.

While direct measures of risk preferences are not available in the 2004 survey, the evidence presented in Section 4.3.1 suggests that attitudes towards risk can not explain the large cross country variation in hospital insurance coverage. Fang et al. (2008) provide evidence that education and cognitive skills are prominent sources of advantageous selection in the Medigap insurance market. Evidence from many European countries suggests a strong positive correlation between education and the probability of purchasing private health insurance.[14] However, so far there is no evidence on whether and through which channels schooling and cognitive skills can determine advantageous selection in the private health insurance market in Europe.

As first step, we start investigating how number of years of schooling and proxies for cognitive skills are correlated both with the probability of purchasing a private hospital insurance and the ex post probability of entering hospital. Insurance companies can not collect information either on education or performances in cognitive tests of insurees. Results for the probit estimates are displayed in the

[14]See Propper et al. (2001) for the UK; Finn and Harmon (2006) for Ireland; Mossialos and Thomson (2004) and references in therein for other European countries. Paccagnella et al. (2008), using data from the first wave of SHARE, find that, while the main determinants of voluntary private health insurance vary across countries, education and cognitive abilities have a strong positive effect on holding a VPHI policy among elderly in EU countries.

upper and lower panel of Table 4.5. For each regressor of interest we estimate two specifications. In the odd columns we present the basic specification that controls for age (in single year dummies), the presence and the age of a partner, gender, the logarithm of household income, dummies for household wealth terciles, employment status, household size, for being obese and smoking. In the second specification, presented in even columns, we add dummies that control non linearly for the number of limitations in activities of daily living and instrumental activities of daily living. The upper panel of Table 4.5 shows a strong and very significant positive correlation between the number of years of formal schooling and the probability of purchasing a health insurance: an extra year of education increases the probability of being covered by a hospital insurance by 0.6 percentage points. Similarly, individuals with better memory and numeracy skills are significantly more likely to have a hospital insurance. The effect of the executive function skills, as measured by the fluency score, on the the probability of being covered by insurance is positive, although very small and not significantly different from zero.

The lower panel of Table 4.5 displays how years of education and cognitive skills are correlated with the ex post probability of spending at least one night in hospital. One extra year of education reduces the probability of entering hospital by 0.4 percentage points. Similarly, individuals with better memory skills are less likely to require hospital treatment. While executive function skills are associate with a lower probability of spending at least one night in hospital, the effect is small and not significantly different from zero. The negative association between numeracy skills and ex post loss probability becomes statistically not significant when we add controls for the number of limitations in daily activities and in instrumental daily activities.

While private hospital insurance allows individuals to choose among a broader set of providers (especially private) and to purchase amenities in public hospitals, a basic set of hospital services are guaranteed under the statutory healthcare system. Private hospital insurance offers a substitute of the statutory coverage for high wealth individuals. This makes wealth a natural candidate as potential source of advantageous selection as insurance companies are prevented from collecting and using information on household wealth. Finkelstein and McGarry (2006) provide evidence that individuals with higher financial wealth are more likely to buy long-term care insurance and less likely to enter a nursing home. Results in the upper and lower of Table 4.5 suggest that household wealth can represent an important source of advantageous selection in the private health insurance market in Europe:

wealthier individual are significantly more likely to buy a hospital insurance and significantly less likely to require a hospital treatment.

4.4.3 — The Role of Health Information

In the previous section we have presented evidence on some of the potential sources of advantageous selection in the private hospital insurance market in Europe. Our results show that formal years of education and cognitive skills can potentially offset the positive correlation between insurance coverage and ex post risk occurrence. Fang et al. (2008) in their analysis of the pathways through which cognitive abilities can determine advantageous selection in the Medigap insurance market, point out three potential (not necessarily exclusive) mechanisms. First, more cognitive able individuals might better evaluate the benefits and the costs of purchasing Medigap. Second, individuals with better cognitive skills have lower search costs. Finally, cognitive skills might be associated with better awareness of health risks. Disentangling among these explanations is extremely challenging but has crucial policy implications. Fang et al. (2008) provide not conclusive evidence that discards the importance of the second mechanism, the search costs, but they do not test for the other mechanisms.

In this work we test whether the ability to acquire health related information can explain, at least in part, the importance of education and cognitive skills as sources of advantageous selection. Consider two individuals who have initially the same health status but different levels of education (cognitive ability). The high education (cognitive ability) individual is more aware of future health risks and the potential needs of hospital treatments than the low education one. The first one is more likely to buy a health insurance than the second. At the same time, the better informed individual is less likely to engage in risky behaviours (e.g. drinking, smoking) and more likely to undergo preventive screening.[15] Different types of health related information might be relevant. Individuals might be more informed about health risk factors and the benefits of early screening. All else being equal, they might simply be better informed about the healthcare system's functioning and its quality standards: for instance, individuals aware of the poor quality of the public hospitals might sign a private insurance in order to secure faster and cheaper access to a private hospital. In our analysis we will not be able to distinguish among different health information contents.

[15]Kenkel (1991) finds that more informed individuals tend to display healthier life styles. Kenkel (1990) provides evidence that poorly informed consumers tend to underestimate the productivity of medical care in treating illness.

Preliminarly, we use data from the Eurobarometer "European citizens and sources of information about health" (2002) to provide evidence on the sources of health information and how they differ according to the level of education. Among others, respondents are asked their main source of information about health and are given the following options: health professionals (doctors, pharmacists, nurses), newspapers, magazines, books, specialist press, television, radio, the Internet, course, family and friends. In addition, for each information source individuals are asked if they ever used it. 45% of the individuals aged 20-80 in the eight European countries covered by our analysis use health professionals as main source of health information. 18% of the sample mainly relies on information received through television, 8% on newspapers and around 4% from the Internet (see Figure 4.5).[16] We use two outcome variables to study how the level of education affects the way how individuals obtain health information. First, we create a dummy variable that takes value 0 if the individual uses health professionals as main source of health information, 1 if the main source is represented by any of the other alternatives mentioned above, that we classify as informal sources. Second, we create a continuous variable for the number of health information sources other than health professionals used by the individual. The results in the first column of Table 4.6 suggest that individuals who have completed tertiary school or higher are more likely to use an informal channel instead of a health professional as main source of health information.[17] Consistently, the number of informal health information sources increases with the level of education (see column 2 of Table 4.6).[18] In summary, these results suggest that more educated individuals are more likely to rely on sources other than health professionals when looking for health related information. This evidence is consistent with the results in social learning models (e.g. Bandiera and Rasul (2006)) that better educated are more likely to be early adopters of new technologies either because they learn faster or because they have more optimistic initial beliefs.

In order to formally test whether more educated (cognitive able) individuals demand more insurance because they have better health information, we exploit variations in the average quality of health promotion across EU regions and we study whether the effect of education and cognitive skills on the probability of purchasing hospital insurance increases as the regional quality of information provided

[16] Bundorf et al. (2004) report that in 2001 38% of Americans looked for or obtained information about their personal health from a source other than their doctors.

[17] The results do not change by assigning value 0 to the dependent variable when the individual uses as main source either specialist press or courses.

[18] When we restrict the sample to individuals aged 50-75 the results are in line with those discussed, but the number of observations becomes relatively small.

by health professionals declines. The ratio of the test is the following: given the same healthcare organization, the incentive to acquire health information through informal channels should be higher in those regions where the quality of information provided by health professional is poorer. However, the evidence discussed above supports the hypothesis that the cost of acquiring health information from sources other than health professionals is lower for better educated. Therefore, if ability to acquire information is one of the driving mechanisms of the correlation between education (cognitive ability) and insurance purchase, we expect the better educated to be less affected by the quality of the information provided by health professionals.

A common feature of the countries considered in this study is that regional governments are largely independent in the allocation of healthcare resources. Therefore, within the same country the quality of health promotion can vary dramatically across regions. Using information on respondents' region of residence (105 regions in total), we construct different measures for quality of health promotion. Our preferred indicator is the proportion of individuals aged over 65 who have been advised to have a flu vaccination. Vaccination against flu has been proved to be a cost effective way to reduce the incidence of respiratory diseases and is offered free of charge to people over 65 in most EU countries. Unlike other preventive treatments, it can be offered and administered by doctors, pharmacists and nurses. The reason for our focus on the percentage advised to have the vaccination rather than on effective take up is that the former is a better proxy for the quality of supply of health promotion, while the latter could be considered as an equilibrium outcome that potentially can be affected by other factors.

Denoting V_j as the proportion of individuals aged 65 or over who have been advised to have the flu vaccination in region j, we estimate the following model:

$$HIns_{ij} = \alpha + \beta_1 E_i + \beta_2 V_j + \beta_3 E_i * V_j + \gamma' X_{ij} + u_{ij} \tag{4.3}$$

where $HIns_{ij}$ takes the value 1 if an individual i in region j was covered by a hospital insurance in year 2004, E_i controls for education (cognitive skills) of individual i. For each proxy for the ability to acquire information we estimate two specifications. In the first specification X_{ij} controls, among other things, for individual demographic characteristics, logarithm of household income, household wealth terciles, dummies for whether the individual smokes or not, she is obese or not, socio-demographic characteristics of region of residence (proportion of women, proportion of individuals aged 65 or above, regional wealth and average number of years of education, tercile dummies for the average waiting time for

an outpatient treatment in the region), and a full set of country dummies. In the second specification we add dummies for the number of limitations in daily activities and instrumental daily activities.

To the extent that health related information explains hospital insurance decisions, we expect β_1 to be positive and β_3 to be negative. We estimate the model in equation (4.3) using both a linear probability and a probit model. Estimation results for the probit model are reported in Table 4.7.

Our results show that years of education and cognitive skills are all positively correlated with the probability of signing a private hospital insurance. On average an extra year of education increases the probability of signing a private hospital insurance by 0.5 percentage points. However, the effect declines significantly as the regional quality of health promotion improves. We find similar results when we study the effect of memory skills. A one standard deviation increase in the score for the recall test is associated with an increase of 1.6 percentage points in the probability of signing a private hospital insurance but the effect significantly declines as the regional proportion of individuals who have been advised flu vaccination increases (see columns 3 and 4 of Table 4.7). The marginal effects on the interactions are hard to interpret. In order to provide a measure of the magnitude of the substitutability between recall and regional quality of health promotion, we undertake the following. We investigate what is the differential effect of a one standard deviation increase in the recall score for a person living in a region with low quality healthcare promotion compared to the effect for a person living in a high quality health promotion region. We classify as low (high) quality health promotion those regions where the average proportion of individuals aged 65 plus that are advised to have a flu vaccination is one standard deviation below (above) the mean.[19] The effect of one standard deviation increase in the recall test is 1.2 percentage points higher in regions with low quality healthcare promotion compared to regions with high quality promotion.

On average a better score in the fluency test has a positive but not significant impact on the probability of signing a hospital insurance. In line with the results presented above, the effect significantly declines as the regional proportion of 65 plus advised to get flu vaccination increases (see columns 5 and 6 of Table 4.7).

In section 4.3.1 we referred to the SHARE survey collecting information on the ability to perform mathematical operations, i.e., the numeracy indicator. According to the cognitive psychology literature this is a proxy for the ability to process

[19] The average proportion is 0.63 and the standard deviation is 0.23.

as opposed to the ability to acquire information.[20] We do not expect any significant substitutability between the ability to perform mathematical operations and the proxy for the cost of acquiring information from health professionals. Consistently, we find that, while the average effect of numeracy is strong and significant, the marginal effect on the interaction term is negative but not significantly different from zero.

In order to boost confidence in our results, we test equation (4.3) using an alternative measure for regional healthcare promotion. According to medical guidelines colonoscopy should be recommended to individuals aged 50 or over, independent of the individual's health history. Unlike the flu vaccination, the test is usually advised by a specialist or a GP, and only in a few countries is free of charge for the over 50s. As an alternative measure for the quality of healthcare promotion we use the regional proportions of individuals aged 50-85 that have been advised to have a colonoscopy. The results in Table 4.8 support those presented in Table 4.7.

The findings in this section suggest that the decision to buy a hospital health insurance is characterized by a significant substitutability between individual ability to acquire information and the average quality of the information provided by health professionals. We interpret these results as evidence in support of the hypothesis that the cost of acquiring health related information is one of the mechanisms that explain the role of education and cognitive skills as sources of advantageous selection in the hospital insurance market in Europe.

4.4.4 — Econometric concerns

So far, we have argued that the fact that the effect of education and cognitive abilities on the probability of taking out a hospital insurance declines as the quality of health promotion increases, is evidence that the cost of acquiring health information matters in the decision to buy a private health insurance. Identification of the information channel effect might be confounded by the possible presence of factors that are correlated with the variables of interest. Decomposing the error term in equation (4.3) into two components $u_{ij} = \epsilon_{ij} + \mu_j$ makes it clear that there might be omitted factors that vary at both the individual-regional and regional levels. More education and better cognitive ability might be associated

[20] The existing literature shows that numerical ability is positively correlated with the propensity to buy more complex retirement plans and invest in the stock market (see Christelis et al. (2005))

with lower discount rates and higher risk aversion,[21] inducing individuals to buy more private insurance and to move to regions where the quality of the healthcare is higher. In that case we would expect the interaction between education (cognitive skills) and proportion of individuals in a region who have been advised to have a flu vaccination to be positive. If anything, our results should represent a downward biased estimate of the degree of substitutability.

Even in the absence of endogenous sorting, if the measures of the ability to acquire information are positively correlated with risk aversion, our results potentially might be explained by the fact that more risk averse individuals are more likely to buy private insurance as a response to the poor quality of the public healthcare. In order to rule out this hypothesis, we test whether the effect of education and cognitive abilities increases with the average waiting time in the region. The marginal effect of the interaction terms, while always positive, is statistically significant only when we take the interaction of the fluency score with the dummy for the highest tercile (see Table 4.9).

So far, we have assumed that the only relevant type of information is health related, but this might not necessarily be the case. Private health insurance might be part of a broader package that includes other types of insurances, e.g. life insurance, home insurance. Therefore, individuals might be more likely to buy private hospital insurances in those regions where the quality of the financial information is better. In order to test this hypothesis, we study whether the effect of education and cognitive abilities is lower in those regions where there is a higher percentage of individuals aged 50 or over who are stockholders. While the regional proportion of stockholders is positively associated with the propensity to buy a private hospital insurance, its correlation with hospital insurance purchase does not vary significantly with education and cognitive ability (see Table 4.10).

§4.5. Conclusions

This paper presents evidence from the first two waves of SHARE to assess the existence of asymmetric information in the market for private hospital insurance among elderly in eight European countries.

So far there is no evidence on whether asymmetric information can contribute to explain the large variation in the proportion of individuals aged 50 plus covered

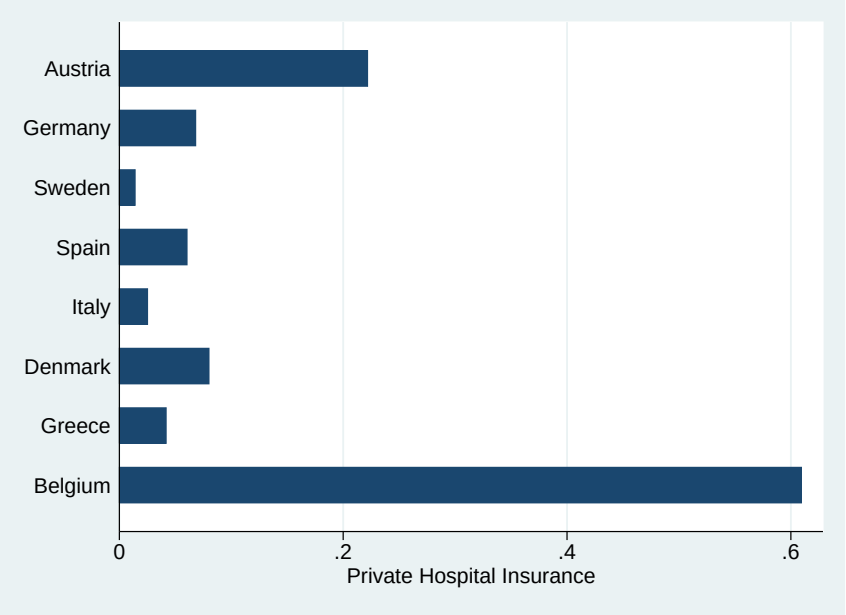
[21] Cutler and Lleras-Muney (2008) argue that on average people with more schooling learn to dislike risk more. However, the empirical relationship between education and risk aversion appears to be u-shaped: very high and very low education levels are associated with more risk taking, whereas individuals with moderate amounts of schooling are the most risk averse.

by private health insurance across European countries. Unidimensional models of private information predict a positive correlation between insurance coverage and ex post loss. Consistent with the evidence for other insurance markets, we fail to detect any significant positive correlation between hospital insurance coverage and the ex post risk of requiring hospital treatment. Using individual self assessments of survival probability, we first test whether individuals have private information on insurance determinants other than their risk type. Our results suggest the presence of multidimensional private information that leads to advantageous selection. Among the potential sources of advantageous selection, we investigate the role of education and cognitive abilities and we find that individuals with better education and cognitive skills are both more likely to subscribe hospital insurance and less likely to need hospital treatments in the future.

To seek for possible explanations for this result, we looked at the ability to acquire health information. We first documented that more informed individuals are more likely to substitute the information received by health professionals with the one acquired through alternative sources, i.e. newspapers, television, the Internet. We then tested whether individuals with better education are less likely to be affected by the quality of health promotion at regional level when deciding whether to buy a private hospital insurance. Our results provide evidence of significant substitutability between the individual ability to acquire information and the quality of healthcare promotion.

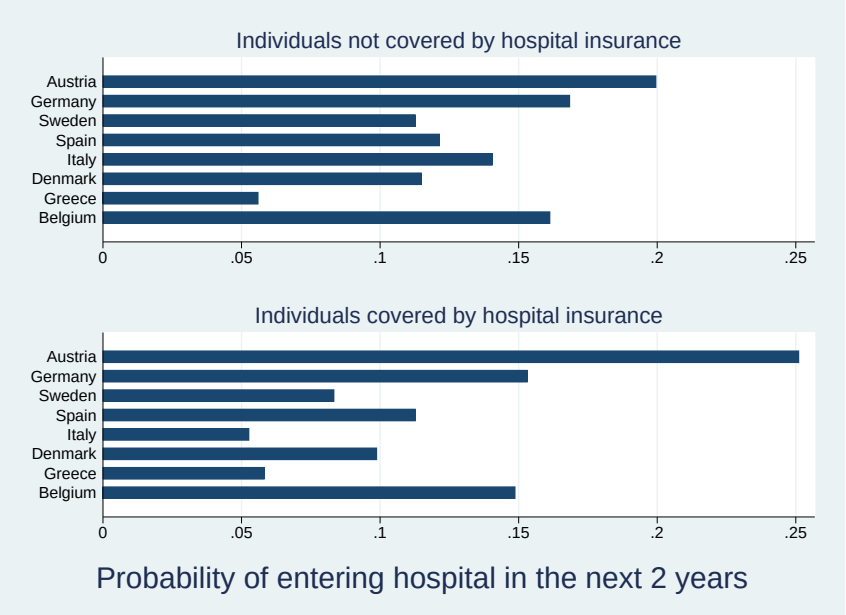
While tax incentives have proved to not be successful in boosting the take up of private health insurance, these findings can be read as evidence that investments in health promotion can have positive indirect effects on the propensity to buy private insurance. Therefore, when evaluating the benefits and costs of health promotion programmes government should take explicit account of their indirect effects.

Figure 4.1: International Comparison: Hospital Insurance Coverage



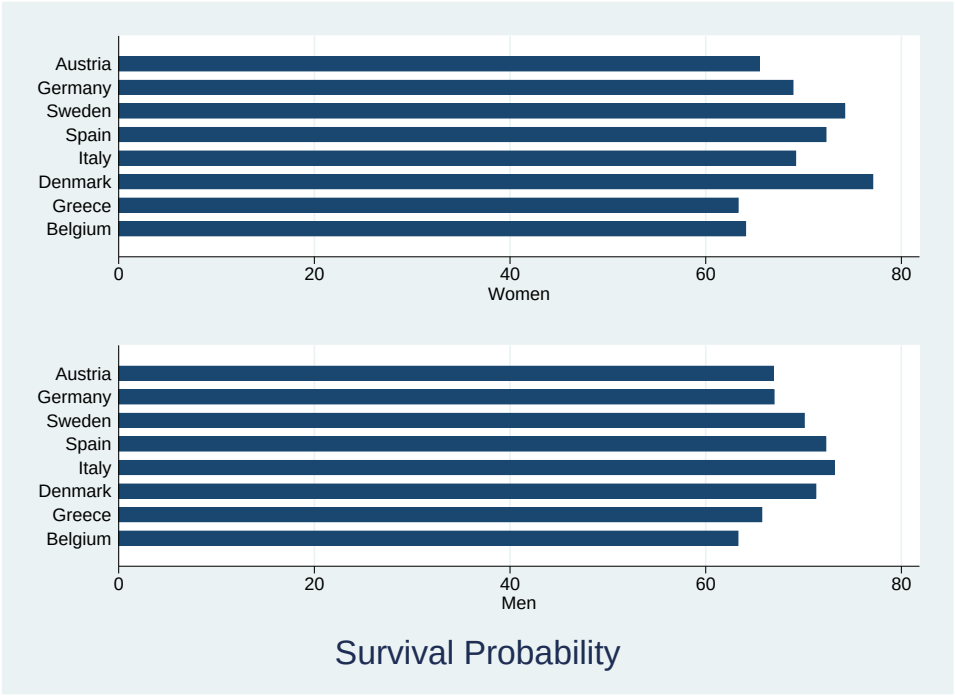
Note: The sample includes individuals aged 50-75 in the 2004 wave.

Figure 4.2: Accident Risk by Hospital Insurance Status



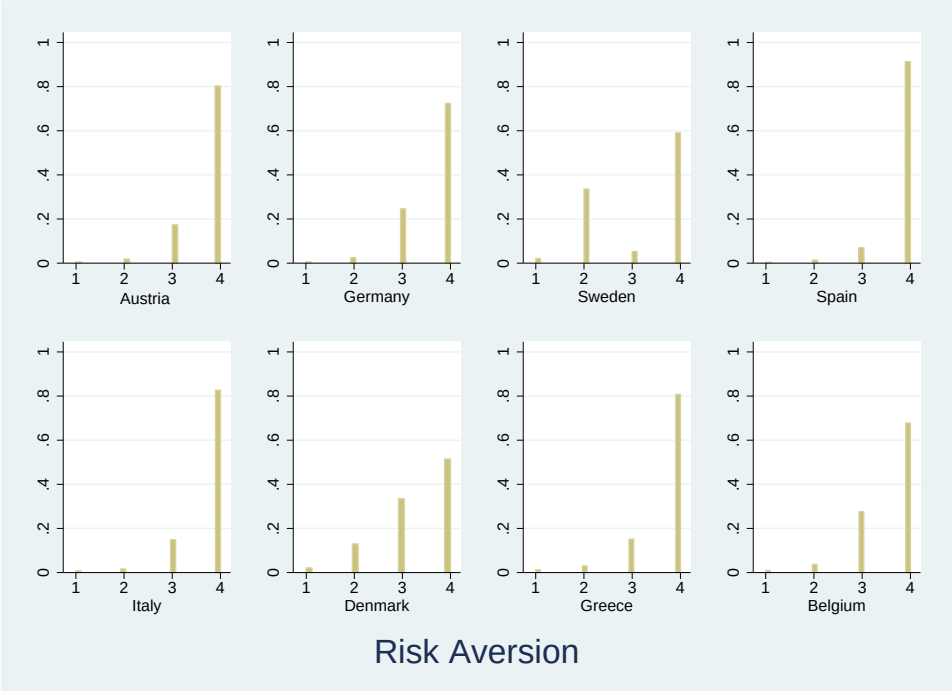
Note: Accident risk is defined as the average probability of having an overnight stay in hospital in the 12 months preceding the 2006 interviews, for individuals aged 50-75 in the 2004 wave. Insurance status is defined according to 2004 responses.

Figure 4.3: Self-Assessed Survival Probability at the Age 75



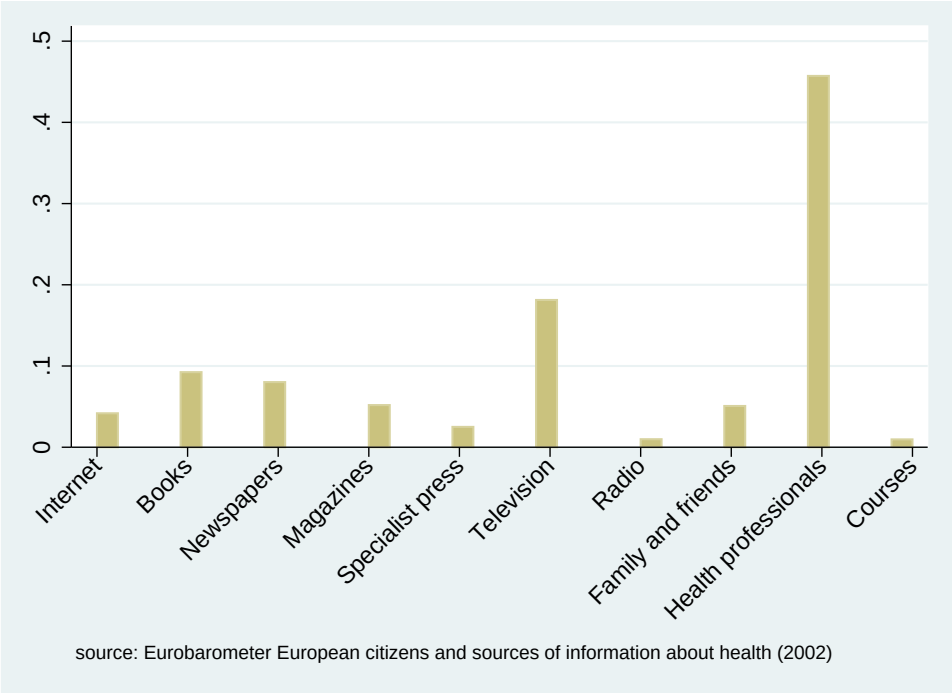
Note: The sample includes men and women aged 50-65 in the 2004 wave. The target age in the survival probability question is 75.

Figure 4.4: Risk Preferences by Country



Note: The sample includes all individuals aged 50-75 interviewed in both 2004 and 2006. Information on risk averseness was elicited in the 2006 wave and is measured by the propensity to take substantial financial risks with the expectation of earning substantial returns. 1 is the lowest level of risk aversion, 4 the highest (see text for explanations).

Figure 4.5: Main Source of Information about Health among European Citizens



Note: The sample includes men and women aged 20-80 in the eight EU countries that are part of our sample.

Table 4.1: VPHI rating criteria

Country	**Variables used for rating premiums**	**Medical Information** **Procedures required for application**
Austria	Age at entry, sex, marital	Insurers are prohibited
	status, individual health status	by law from carrying out examinations
Belgium	Mutual: group rates according to the level of coverage. Commercial:	Mutual: only some mutuals require a medical questionnaire.
	age, sex, area of residence, level of coverage, level of deductible	Commercial: medical questionnaire and/or examination
Denmark	Mutual: group rates according to the level of coverage.	Medical questionnaire
	Commercial: age, employment status	
Germany	Age at entry, sex, health status	Medical questionnaire
Greece	Age, sex, profession, family and individual health status	Medical questionnaire, examination, x-rays
Italy	Age, sex, health status, area of residence	Medical questionnaire
Spain	Age, sex	Medical questionnaire
Sweden	Age, health status	Medical questionnaire, examination (in rare cases)

Source: Mossialos and Thomson (2004)

Table 4.2: Descriptives

	Austria	**Germany**	**Sweden**	**Spain**	**Italy**	**Denmark**	**Greece**	**Belgium**
Education	11.415	13.857	10.826	5.945	7.312	13.316	9.442	10.861
	(2.548)	(2.579)	(3.131)	(4.256)	(4.154)	(3.100)	(4.605)	(3.643)
Memory	5.395	5.649	5.631	3.834	4.325	5.755	5.105	5.203
	(1.751)	(1.579)	(1.536)	(1.669)	(1.552)	(1.559)	(1.505)	(1.591)
Verbal Fluency	22.895	21.404	24.491	15.524	14.715	22.667	15.158	20.628
	(9.228)	(6.846)	(6.883)	(5.353)	(5.548)	(6.657)	(4.759)	(6.152)
Numeracy	3.739	3.766	3.767	2.563	2.952	3.637	3.526	3.444
	(0.934)	(0.996)	(0.965)	(1.025)	(0.994)	(1.058)	(1.047)	(0.991)

Note: Descriptives are based on the 2004 answers of individuals aged 50-75. Standard deviations are reported in parenthesis.

Table 4.3: Positive Correlation Test

	Baseline	Inter I	Inter II	Inter III
Correlation Coefficient Bivariate Probit	0.003	0.004	-0.020	0.014
Likelihood Ratio Test	0.005	0.007	0.143	0.074
Insurers Controls	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes
Set I*Country Dummies	No	Yes	No	No
Set II*Country Dummies	No	No	Yes	No
Set III*Country Dummies	No	No	No	Yes
Observations	4647	4647	4647	4647

Note: The dependent variables of the bivariate probit are the dummy for whether the individual has hospital private insurance cover in 2004 and the dummy that takes value 1 if the individual has been in hospital over night in the 12 months preceding the 2006 interview. Individual characteristics were measured in 2004 survey. *Insurers Controls* include controls for age (in single year dummies), sex, marital status, age of spouse, employment status, residence in a metropolitan area, household income terciles, household wealth terciles, for whether the premia have been entirely paid by the insuree, for current and past health status (see text for the complete list). *Set I* includes dummies for sex, occupational status (civil servant, self employed and retired), and residence in a metropolitan area. *Set II* includes the full set of single year age dummies. *Set III* includes dummies that control for the number of limitations in activities of daily living and in instrumental activities of daily living, for smoking and for being obese.

Table 4.4: Test for residual private information

	Baseline		Inter I		Inter II		Inter III	
	Hospital Overnight	Hospital Insurance	Hospital Overnight	Hospital Insurance	Hospital Overnight	Hospital Insurance	Hospital Overnight	Hospital Insurance
Survival Probability	-0.265***	0.277**	-0.269***	0.283**	-0.270***	0.264*	-0.295***	0.263**
	(0.096)	(0.129)	(0.097)	(0.126)	(0.103)	(0.139)	(0.098)	(0.131)
	[-0.052]	[0.035]	[-0.053]	[0.035]	[-0.050]	[0.031]	[-0.057]	[0.032]
Correlation Coefficient Bivariate Probit	0.009		0.012		-0.014		0.023	
Likelihood Ratio Test	0.034		0.060		0.061		0.185	
Insurers Controls	Yes		Yes		Yes		Yes	
Country Dummies	Yes		Yes		Yes		Yes	
Set I*Country Dummies	No		Yes		No		No	
Set II*Country Dummies	No		No		Yes		No	
Set III*Country Dummies	No		No		No		Yes	
Observations	4472		4472		4472		4472	

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors of bivariate probit coefficients are reported in parenthesis. Marginal effects are reported in brackets. The dependent variables for the bivariate probit are the dummy for whether the individual owned a hospital private insurance in 2004 and the dummy that takes the value 1 if the individual has been in hospital over night in the 12 months preceding the 2006 interview. Survival probability has been rescaled to between 0 and 1. *Insurers Controls*, *Set I*, *Set II* and *Set III* are defined as in Table 4.3.

Table 4.5: Sources of Advantageous Selection

Dep. Variable: Having a hospital insurance in 2004								
Education	0.006***	0.006***						
	(0.001)	(0.001)						
Memory			0.009***	0.009***				
			(0.003)	(0.003)				
Verbal fluency					0.001	0.001		
					(0.001)	(0.001)		
Numeracy							0.015***	0.015***
							(0.004)	(0.004)
II Wealth Tercile	0.032***	0.032***	0.033***	0.033***	0.035***	0.035***	0.032***	0.032***
	(0.012)	(0.012)	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.012)
III Wealth Tercile	0.062***	0.062***	0.067***	0.067***	0.070***	0.070***	0.065***	0.065***
	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Dep. Variable: Having spent one night in hospital in 12 months before 2006 interview								
Education	-0.004***	-0.004***						
	(0.001)	(0.001)						
Memory			-0.007**	-0.005*				
			(0.003)	(0.003)				
Verbal fluency					-0.001	-0.000		
					(0.001)	(0.001)		
Numeracy							-0.010**	-0.007
							(0.005)	(0.005)
II Wealth Tercile	-0.029***	-0.026**	-0.028***	-0.025**	-0.030***	-0.028***	-0.029***	-0.026**
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
III Wealth Tercile	-0.025**	-0.021*	-0.027**	-0.023**	-0.030**	-0.025**	-0.029**	-0.024**
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Health Controls	No	Yes	No	Yes	No	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5858	5858	5857	5857	5843	5843	5877	5877

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects from heteroskedasticity robust univariate probit are reported. *Baseline Controls* include single year age dummies, sex, marital status, employment status dummies, household size, household income (in logs), wealth terciles, dummies for whether the individual is obese and smokes as recorded in 2004. *Health Controls* include dummies for having one (two or more) limitation to activities of daily living, dummies for having one (two or more) limitation in instrumental activities of daily living.

Table 4.6: Education and Health Information Sources

	Informal as main source (Y/N)	Number of informal sources
Age 30-40	-0.003	0.005
	(0.018)	(0.050)
Age 40-50	-0.020	0.057
	(0.018)	(0.051)
Age 50-60	-0.026	0.068
	(0.019)	(0.054)
Age 60+	-0.067***	-0.029
	(0.017)	(0.049)
Secondary Education	0.024	0.201***
	(0.018)	(0.049)
Tertiary Education	0.092***	0.501***
	(0.020)	(0.056)
Country Dummies	Yes	Yes
Observations	7225	7393

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects from heteroskedasticity robust univariate probit are reported in the first column. OLS coefficients are reported in the second column. The dependent variable in the first column is the dummy variable that takes value 0 if the individual uses a health professional as main source, 1 if the main source is one of the following: newspapers, magazines, books, specialist press, television, radio, the Internet, course, family and friends. The dependent variable in the second column is the total number of health sources other than health professionals used by the individual and it can vary between 0 and 8. Results are based on the Eurobarometer "European citizens and sources of information about health" (2002). Additional controls include dummies for sex, marital status, employment status. The sample includes individuals aged 20-80 in the eight countries covered in the main analysis.

Table 4.7: Hospital Insurance Take Up and Quality of Health Promotion

Years of Education	0.005***	0.005***						
	(0.001)	(0.001)						
Memory			0.008***	0.009***				
			(0.003)	(0.003)				
Verbal fluency					0.001	0.001		
					(0.001)	(0.001)		
Numeracy							0.014***	0.014***
							(0.004)	(0.004)
% Advised Flu Vacc.	-0.020	-0.020	-0.027	-0.027	-0.041	-0.041	-0.027	-0.027
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.040)	(0.040)
Education*Adv. Flu Vacc.	-0.011**	-0.011**						
	(0.006)	(0.006)						
Memory*Adv. Flu Vacc.			-0.032**	-0.032**				
			(0.015)	(0.015)				
Verbal fluency*Adv. Flu Vacc					-0.007**	-0.007**		
					(0.004)	(0.004)		
Numeracy*Adv. Flu Vacc							-0.029	-0.029
							(0.022)	(0.022)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Health Controls	No	Yes	No	Yes	No	Yes	No	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5870	5870	5869	5869	5855	5855	5889	5889

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects from heteroskedasticity robust univariate probit are reported. The dependent variable is the dummy for whether the individual had a private pension in 2004. The marginal effect on the interaction term is calculated using the method suggested by Norton et al. (2004). Standard errors are calculated using 200 bootstrap repetitions. % Advised Flu Vacc. is the proportion of individuals in the region aged 65 or over that were advised by a health professional to have a flu vaccination. *Baseline Controls* include single year age dummies, sex, marital status, occupational dummies, household size, household income (in logs), wealth terciles, dummies for whether the individual is obese and is a smoker as recorded in 2004, and regional characteristics. They also include regional characteristics: the proportion of women, the proportion of people aged 65 or over, average number of years of education, wealth terciles and dummies for outpatient waiting times terciles. *Health Controls* include dummies for having one (two or more) limitation to activities of daily living, dummies for having one (two or more) limitation in instrumental activities of daily living.

Table 4.8: Hospital Insurance and Alternative Measure of Health Promotion

Years of Education	0.005***	0.005***						
	(0.001)	(0.001)						
Memory			0.009***	0.009***				
			(0.003)	(0.003)				
Verbal Fluency					0.001	0.001		
					(0.001)	(0.001)		
Numeracy							0.014***	0.014***
							(0.004)	(0.004)
% Advised Colonscopy	0.043	0.042	0.037	0.037	0.050	0.050	0.047	0.046
	(0.062)	(0.062)	(0.063)	(0.064)	(0.065)	(0.065)	(0.064)	(0.064)
Education*% Adv. Colonscopy	-0.006	-0.006						
	(0.012)	(0.012)						
Memory*% Adv. Colonscopy			-0.047*	-0.048*				
			(0.025)	(0.025)				
Fluency*% Adv. Colonscopy					-0.012**	-0.012**		
					(0.006)	(0.006)		
Numeracy*% Adv. Colonscopy							-0.001	-0.002
							(0.040)	(0.040)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Health Controls	No	Yes	No	Yes	No	Yes	No	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5874	5874	5873	5873	5859	5859	5893	5893

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects from heteroskedasticity robust univariate probit are reported. The dependent variable is the dummy for whether the individual had a private pension in 2004. The marginal effect on the interaction term is calculated using the method suggested by Norton et al. (2004). Standard errors are calculated using 200 bootstrap repetitions. % Advised Colonoscopy is the proportion of individuals in the region aged 50 or over that were advised by a health professional to have a colonoscopy. *Baseline Controls* and the *Health Controls* are defined as in Table 4.7

Table 4.9: Hospital Insurance Take Up and Waiting Time

Years of Education	0.005***	0.005***						
	(0.001)	(0.001)						
Recall			0.009***	0.009***				
			(0.003)	(0.003)				
Verbal Fluency					0.001	0.001		
					(0.001)	(0.001)		
Numeracy							0.014***	0.014***
							(0.004)	(0.004)
Regio Wait II	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.005	-0.005
	(0.011)	(0.011)	(0.012)	(0.012)	(0.010)	(0.010)	(0.010)	(0.010)
Regio Wait III	-0.004	-0.004	-0.003	-0.003	-0.004	-0.004	-0.006	-0.006
	(0.017)	(0.017)	(0.016)	(0.016)	(0.015)	(0.015)	(0.017)	(0.017)
Education*Regio Wait II	-0.000	-0.000						
	(0.002)	(0.002)						
Education*Regio Wait III	0.004	0.004						
	(0.003)	(0.003)						
Recall*Regio Wait II			0.007	0.007				
			(0.006)	(0.006)				
Recall*Regio Wait III			0.009	0.009				
			(0.007)	(0.007)				
Fluency*Regio Wait II					0.001	0.001		
					(0.001)	(0.001)		
Fluency*Regio Wait III					0.003**	0.003**		
					(0.002)	(0.002)		
Numeracy*Regio Wait II							0.012	0.012
							(0.009)	(0.009)
Numeracy*Regio Wait III							0.004	0.004
							(0.011)	(0.011)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Health Controls	No	Yes	No	Yes	No	Yes	No	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5870	5870	5869	5869	5855	5855	5889	5889

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects from heteroskedasticity robust univariate probit are reported. The dependent variable for the univariate probit is the dummy for whether the individual owned a hospital private insurance in 2004. The marginal effect on the interaction term has been calculated using the method suggested by Norton et al. (2004). Standard errors are calculated using 200 bootstrap repetitions. Wait Time II and III are the second and third terciles of regional waiting time calculated as a sample weighted average of individual responses on the number of months delay before the last outpatient treatment. *Baseline Controls* and *Health Controls* are defined as in Table 4.7.

Table 4.10: Hospital Insurance Take Up and Stock Market Participation

Years of Education	0.005***	0.005***						
	(0.001)	(0.001)						
Recall			0.009***	0.009***				
			(0.003)	(0.003)				
Verbal Fluency					0.001	0.001		
					(0.001)	(0.001)		
Numeracy							0.014***	0.014***
							(0.004)	(0.004)
% Stock Market	0.263	0.268	0.242	0.248	0.239	0.244	0.240	0.244
	(0.167)	(0.167)	(0.160)	(0.160)	(0.170)	(0.169)	(0.158)	(0.157)
Education*% Stock Market	-0.009	-0.010						
	(0.014)	(0.014)						
Recall*% Stock Market			-0.008	-0.008				
			(0.034)	(0.034)				
Fluency*% Stock Market					0.006	0.006		
					(0.008)	(0.008)		
Numeracy*% Stock Market							-0.029	-0.029
							(0.042)	(0.042)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Health Controls	No	Yes	No	Yes	No	Yes	No	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5878	5878	5877	5877	5863	5863	5897	5897

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects from heteroskedasticity robust univariate probit. The dependent variable for the univariate probit is the dummy for whether the individual had a hospital private insurance in 2004. The marginal effect on the interaction term is calculated using the method suggested by Norton et al. (2004). Standard errors are calculated using 200 bootstrap repetitions. % Stock Market is the proportion of individuals in the region aged 50 or over that invest in the stock market. *Baseline Controls* and *Health Controls* are defined as in Table 4.7.

Conclusions

Both medical and economic literature have long emphasized that lack of information and cultural barriers can affect the demand for healthcare. However, previous works do not provide conclusive evidence on the role of these two mechanisms as important determinants of individual health related behaviour. In this work we exploit both data from randomized control trials and observational studies to separately identify the effects of information and social norms on the demand for healthcare. We provide evidence that both in developed and developing countries public interventions can affect, either directly or indirectly, the level of information about health related issues and the social acceptability of particular medical tests.

In the first chapter, we exploit the randomized research design of PROGRESA, a conditional cash transfer programme implemented in rural Mexico, to show that health interventions can have indirect effects on the propensity to screen for gender specific diseases. While women who live in beneficiary households have to undertake cervical cancer screening in order to receive the cash transfer, we document an increase in the compliance with cervical cancer screening among those women who are not entitled to receive the benefit. But we do not find evidence of spillover effects for non gender specific tests. We show that the indirect effect is driven by an increased social acceptance of the test and an increased awareness among those women who are more at risk of contracting cervical cancer.

In the second chapter, we exploit the randomized design of the PAL nutrition programme, implemented in rural areas of Mexico, to show that increased information is one of the mechanisms through which conditional cash transfer programmes can affect the health related behaviour of eligible adults. We show that attending health and nutrition sessions can lead to a significant reduction in the probability of a large waist circumference among women, who are the ones responsible to attend the educational courses. We document that the effect is driven by a reduction in the calorie intake. However, our results suggest that men do not benefit from the exposure to health and nutrition information of their

partners.

In the third chapter we consider whether and to what extent quality of primary care can affect the take up of two widely recommended tests, mammography and colonoscopy. We exploit data on individuals aged 50 plus in eight European countries to show that improvements in General Practitioners quality can significantly increase the compliance with these two screening examinations. We also find that the effect of GP quality increases with years of formal schooling and with cognitive abilities. The most likely explanation for this result is that better educated individuals screen more because they are more likely to internalize the information received by their GPs.

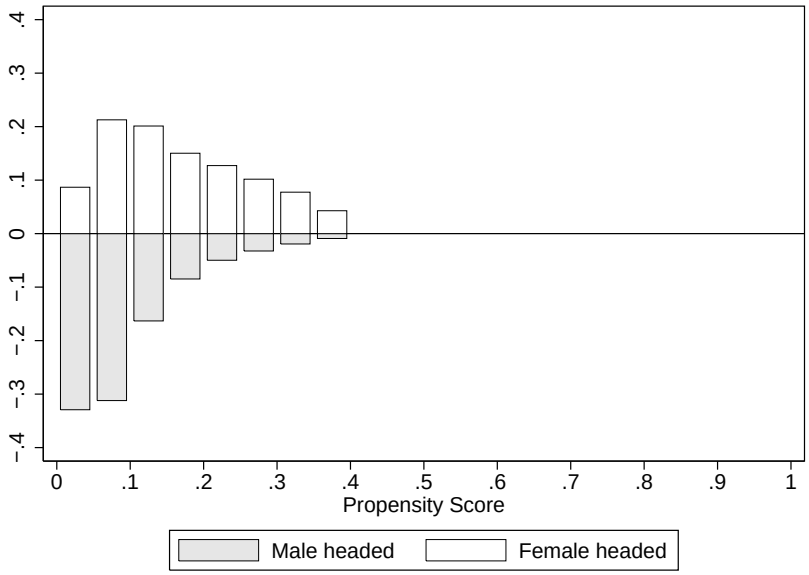
The last chapter studies whether the cost to acquire health information can be an important determinant of the decision to buy a supplementary private health insurance and whether it can partially explain the large cross country variation in private health insurance across European countries. We first document that in the eight European countries covered by our analysis there are individual characteristics, not observed by insurance companies, that are positively correlated with the probability of buying a private hospital insurance and negatively correlated with the ex post probability of requiring hospital treatments. We then provide suggestive evidence that this opposite correlation can be partially explained by the fact that individual ability to acquire information acts as a substitute for the quality of healthcare promotion.

Information is an important determinant of individual health related behaviour. Both in developed and developing countries there are many concerns about the introduction of health promotion programmes, mainly driven by the uncertainty about their costs and benefits. The findings of this work suggest important policy implications both for developing and developed countries. First, the design and evaluation of health programmes should explicitly take account of potential externalities from eligibles to non-eligibles, as the evaluation of a programme's benefits might change substantially if externalities are considered. Second, while in the short run health promotion programmes can increase the pressure on public health expenditure, a better awareness of health risks can lead to a reduction of the costs associated with the treatment of chronic conditions.

APPENDIX A

Additional Figures and Tables of Chapter 2

Figure A.1: Appendix: Propensity scores for Female and Male headed households



Note: The propensity score is based on the following observable characteristics - age of household head, household composition ratios (male and females for age groups 0-4, 5-10, 11-14, 15-19, 20-34, 35-54 and over 55), household poverty index and its square, distance from a SSA provider, the percentage of eligibles in the village, variables for sex related behaviour of female respondents (number of pregnancies, dummy variables for whether they ever used contraception methods and whether they ever had a PAP test), female status index, dummy variables for whether the household head is working, is literate, speaks the indigenous language, whether the household owns land, whether there is an electricity supply, and state fixed effects. The variables are elicited either in October 1997 or March 1998

Table A.1: Household composition and the demand for health, DD

Marginal effects from probit estimations, standard errors are clustered by village

Non-eligibles with no women over 45

	Cerv. Cancer screening	Blood Sugar screening	Blood Pressure screening	Health Center visit
98o	0.129***	0.221***	0.203***	-0.042
	(0.014)	(0.013)	(0.012)	(0.011)
T	-0.008	0.010	0.000	0.008
	(0.019)	(0.017)	(0.016)	(0.013)
T*98o	0.054**	-0.028	0.003	-0.021
	(0.025)	(0.024)	(0.023)	(0.023)
Observations	8343	8481	8557	8893

Non-eligibles with at least one woman over 45

	Cerv. Cancer screening	Blood Sugar screening	Blood Pressure screening	Health Center visit
98o	0.124***	0.209***	0.183***	-0.057***
	(0.014)	(0.012)	(0.012)	(0.011)
T	0.009	0.043	0.051**	0.007
	(0.016)	(0.017)	(0.016)	(0.013)
T*98o	0.051**	0.019	0.009	0.004
	(0.026)	(0.023)	(0.023)	(0.022)
Observations	9272	10575	10647	11105

Note: *** denotes significance at 1%, ** at 5% and * at 10%. The amounts are expressed in *pesos* at October 1997 values. Marginal effects are calculated as average partial effects. Standard errors are derived using the delta method. All specifications also control for the variables included in the regressions presented in table 1.4.

Table A.2: PROGRESA and the demand for health, DD for non-eligibles

Marginal effects from probit estimations, standard errors are clustered by village

	Cerv. Cancer screening	Blood Sugar screening	Blood Pressure screening	Health Center visit
98o	0.125***	0.203***	0.180***	-0.051***
	(0.012)	(0.011)	(0.010)	(0.010)
T	-0.011**	0.022	0.023	0.003
	(0.016)	(0.015)	(0.014)	(0.011)
T*98o	0.053**	0.001	0.011	0.000
	(0.023)	(0.020)	(0.020)	(0.020)
log visit fee	-0.010	-0.033***	-0.033***	-0.020***
	(0.008)	(0.008)	(0.007)	(0.006)
SSA clinic	0.035	0.023	0.012	-0.004
	(0.025)	(0.022)	(0.022)	(0.014)
IMSS Solid. clinic	0.002	0.093**	0.075**	0.069**
	(0.045)	(0.041)	(0.037)	(0.034)
IMSS clinic	-0.145***	-0.063	-0.103***	-0.005
	(0.034)	(0.042)	(0.042)	(0.019)
Private doctor	-0.059	-0.015	-0.069***	0.009
	(0.040)	(0.024)	(0.025)	(0.016)
Medical aid	0.038**	0.026*	0.043***	0.004
	(0.016)	(0.016)	(0.015)	(0.011)
Mobile unit	0.012	0.016	0.000	-0.011
	(0.018)	(0.016)	(0.016)	(0.013)
Observations	16042	17389	17530	18270

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Marginal effects are calculated as average partial effects. Standard errors are derived using the delta method. Log visit fee is the log of the village average consultation fee paid by non-eligibles.

Table A.3: Learning in cervical cancer: Effect of initial information

Marginal effects from ivprobit estimations,
bootstrapped standard errors are clustered by village

	Full Sample	Male Head	Female Head
Peer group screening rate	0.463***	0.492***	0.005
	(0.124)	(0.123)	(0.417)
No contraception	-0.112***	-0.118***	-0.050
	(0.013)	(0.012)	(0.046)
Peer group screening rate* no contraception	0.205**	0.170*	0.474*
	(0.094)	(0.099)	(0.288)
Observations	9061	8258	803
Cragg Donald Test	53.711	48.485	4.232
Cragg Donald χ^2	215.558	194.623	17.563

Note: *** denotes significance at 1%, ** at 5% and * at 10%. The peer group is defined by all the households in the village whose eldest children's age is within a 2 year difference range. The level of initial information is proxied by the dummy for having never used any method of contraception, as recorded in March 1998. The IV strategy exploits the the treatment effect, the average number of payments received by the eligibles in the peer group and their interaction as the instrument. The IV probit is calculated using a two stage procedure based on the control function approach. Marginal effects are calculated as average partial effects. Standard errors are calculated with 200 bootstrap repetitions clustered at village level. The Cragg Donald test for the validity of the rank condition is reported. All specifications also control for the variables included in the regressions presented in table 1.4.

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