ΠΑΝΕΠΙΣΤΗΜΙΟ ΜΑΚΕΔΟΝΙΑΣ

ΤΜΗΜΑ ΟΙΚΟΝΟΜΙΚΩΝ ΕΠΙΣΤΗΜΩΝ

ΕΜΠΕΙΡΙΚΗ ΑΝΑΛΥΣΗ ΤΩΝ ΔΑΠΑΝΩΝ ΥΓΕΙΑΣ ΚΑΙ ΤΩΝ ΦΑΡΜΑΚΕΥΤΙΚΩΝ ΔΑΠΑΝΩΝ ΣΤΗΝ ΕΛΛΑΔΑ ΚΑΙ ΣΕ ΑΛΛΕΣ ΧΩΡΕΣ ΤΗΣ ΕΥΡΩΠΗΣ

ΛΑΜΠΡΕΛΛΗ ΔΗΜΗΤΡΑ

ΔΙΔΑΚΤΟΡΙΚΗ ΔΙΑΤΡΙΒΗ

Επιβλέπων Καθηγητής: Καθηγήτρια Νικολάου Αγγελική

Μέλη Τριμελούς Επιτροπής: Αν. Καθηγητής Owen O’ Donnell Αν.

Καθηγητής Βελέντζας Κωνσταντίνος

Το έργο συγχρηματοδοτείται

- **75% της Δημόσιας Δαπάνης από την Ευρωπαϊκή Ένωση – Ευρωπαϊκό Κοινωνικό Ταμείο**
- **25% της Δημόσιας Δαπάνης από το Ελληνικό Δημόσιο – Υπουργείο Ανάπτυξης – Γενική Γραμματεία Έρευνας και Τεχνολογίας**
- **και από τον Ιδιωτικό Τομέα**

στο πλαίσιο του Μέτρου 8.3 του Ε.Π. Ανταγωνιστικότητα – Γ΄ Κοινοτικό Πλαίσιο Στήριξης.

Στους γονείς μου

Θόδωρο & Εύα

Ευχαριστίες

Θα ήθελα να εκφράσω τις θερμές και ειλικρινείς μου ευχαριστίες προς τον αείμνηστο καθηγητή Μιχάλη Χατζηπροκοπίου, που για ένα μεγάλο χρονικό διάστημα είχα την τύχη να είναι ο επιβλέπων καθηγητής της παρούσας διατριβής. Θα ήθελαν να ευχαριστήσω ιδιαιτέρως τον καθηγητή μου Owen O' Donnell, που με την συνεχή καθοδήγησή του συνέβαλε αποφασιστικά στον προσανατολισμό καίριων ερωτημάτων της παρούσας μελέτης. Θα ήθελα επίσης να το ευχαριστήσω για την άριστη επιστημονική καθοδήγηση και για την πνευματική όπως και ηθική αρωγή που μου παρείχε καθ' όλη τη διάρκεια της εκπόνησης της διδακτορικής μου διατριβής. Θα ήθελα επίσης ιδιαιτέρως να ευχαριστήσω την Καθηγήτρια Αγγελική Νικολάου, που ανέλαβε την επίβλεψη και την καθοδήγηση της παρούσας διατριβής σε μία κρίσιμη φάση της ολοκλήρωσής της καθώς και τον Καθηγητή Κωνσταντίνο Βελέντζα που μου έκανε την τιμή να συμμετάσχει στην Τριμελή Επιτροπή μου και να βοηθήσει στην ολοκλήρωση της διατριβής μου. Ευχαριστίες επίσης θα ήθελα να εκφράσω επίσης και στα μέλη της επταμελούς επιτροπής καθηγητή Ιωάννη Καραγιάννη, επ. Καθηγητή Βασίλειο Αλετρά, επ. καθηγήτρια Γείτονα- Κοντούλη Μαρία για τις πολύτιμες υποδείξεις και επισημάνσεις τους καθώς και τον επ. καθηγητή Πλάτων Τήνιο για την επιστημονική καθοδήγηση και συνεργασία. Ευχαριστίες επίσης οφείλω στους συναδέλφους μου Δρ Δεργιαδέ Θεολόγο, Δρ Τσίντζο Παναγιώτη, Δρ Πάνο Γεώργιο και Νίκο Βεντούρη για τις ενδιαφέρουσες προτάσεις τους και τη συναδελφική υποστήριξη.

Θα ήθελα επίσης να ευχαριστήσω το Τμήμα Οικονομικών Επιστημών του Πανεπιστημίου Μακεδονίας για την φιλοξενία και την παροχή της υλικοτεχνικής υποδομής για την ολοκλήρωση της διδακτορικής διατριβής. Επίσης την εταιρεία Ινnοβάτια ΕΠΕ και τον Δρ Ιωάννη Τόλια που ανέλαβε μέρος της χρηματοδότησης της διδακτορικής διατριβής μέσω του έργου ΠΕΝΕΔ: Πρόγραμμα Ενίσχυσης Ερευνητικού Δυναμικού- 2003.

Θερμές ευχαριστίες θα ήθελα να εκφράσω στον Ανδρέα Μπρούσαλη, χωρίς την αμέριστη συμπαράσταση και προτροπή του οποίου, ίσως να μη γινόταν ποτέ η αρχή της πορείας αυτής. Επίσης θα ήθελα να εκφράσω θερμές ευχαριστίες στον Αντώνη Χατζηγιαννάκη, Ειρήνη Χριστάκη, Λένα Λατινοπούλου και την αδερφή μου Όλγα Λαμπρέλλη χωρίς την πολύτιμη συμπαράσταση των οποίων, η διαδικασία της έρευνας και συγγραφής της παρούσας διδακτορικής διατριβής δεν θα ήταν τόσο πλήρης.

Θα ήθελα να ευχαριστήσω τους δασκάλους μου, Κατσαρού Tilda, Πατρώνου Μαρία, Μάργαρη Οδυσσέα και Faltenbacher Matthias για την πνευματική καθοδήγηση τους . Τέλος ευχαριστώ θερμά την οικογένειά μου για την ηθική αλλά και οικονομική υποστήριξη και συμπαράσταση καθόλη τη διάρκεια των σπουδών μου.

Περίληψη

Η Παρούσα Διδακτορική Διατριβή παρουσιάζει μία σειρά από εμπειρικές μελέτες με έναυσμα ένα καίριο ζήτημα πολιτικής στην Ελλάδα και σε άλλες Ευρωπαϊκές χώρες – τις διογκούμενες φαρμακευτικές δαπάνες, οι οποίες αυξάνονται τόσο ως μερίδιο των συνολικών δαπανών υγείας όσο και ως ποσοστό του εθνικού εισοδήματος, ενώ ταυτόχρονα επιβαρύνουν τον προϋπολογισμό των νοικοκυριών. Το κάθε ένα από τα κύρια τέσσερα κεφάλαια αποτελεί μία αυτοτελή μελέτη αλλά όλα τα κεφάλαια συμβάλλουν σε έναν ενιαίο σκοπό που είναι η κατανόηση των καθοριστικών παραγόντων και των συνεπειών των φαρμακευτικών δαπανών.

Το πρώτο κεφάλαιο αποτελεί την εισαγωγή. Το δεύτερο κεφάλαιο αναλύει την κατά 146% αύξηση των πραγματικών φαρμακευτικών δαπανών του Ιδρύματος Κοινωνικής Ασφάλισης (ΙΚΑ) κατά την περίοδο 1991-2003, στις παρακάτω συνιστώσες: επίδραση των τιμών, επίδραση του όγκου και επίδραση του φαινομένου της αντικατάστασης παλαιότερων φαρμάκων με νέα ακριβότερα προϊόντα. Η ανάλυση καταδεικνύει ότι οι σχετικές τιμές των φαρμάκων μειώθηκαν στην αντίστοιχη περίοδο κατά 55%, ενώ ο όγκος αυξήθηκε μόλις κατά 32%. Συνεπώς, η αύξηση των φαρμακευτικών δαπανών οφείλεται κατά κύριο λόγο στις δαπάνες σε νεότερα σκευάσματα και στην αντικατάσταση παλαιότερων, φθηνότερων φαρμάκων. Η ανάλυση υποδεικνύει ότι οι πολιτικές ελέγχουν των τιμών, στις οποίες η Ελλάδα βασίζεται σχεδόν εξολοκλήρου, αποτελούν έναν αδύναμο μηχανισμό για τον περιορισμό των συνολικών φαρμακευτικών δαπανών.

Το τρίτο κεφάλαιο επιχειρεί να εξηγήσει τις αποκλίσεις στην χρήση φαρμάκων στους ηλικιωμένους πληθυσμούς έντεκα Ευρωπαϊκών χώρες κάνοντας χρήση αξιόπιστων συγκρίσιμων στοιχείων σε ατομικό επίπεδο. Τα μίκρο στοιχεία συμπληρώνονται από δείκτες του ρυθμιστικού πλαισίου και της προσφοράς των φαρμακευτικών προϊόντων, προκειμένου να προσδιοριστεί το μέγεθος της διακύμανσης στην χρήση φαρμάκων που εξηγείται από παράγοντες πολιτικής.

Μετά τον έλεγχο για διαφορές στην ανάγκη για υγειονομική περίθαλψη, στα κοινωνικό-οικονομικά χαρακτηριστικά και στους οργανωτικούς παράγοντες, περισσότερο από το ένα-τρίτο της μεταξύ των χωρών διακύμανσης παραμένει ανεξήγητη, γεγονός που μπορεί να αντικατοπτρίζει τον ισχυρό ρόλο των πολιτιστικών διαφορών στις συμπεριφορές που σχετίζονται με τη συνταγογράφηση και τη χρήση φαρμάκων.

Το κεφάλαιο 4, καταδεικνύει μία πολύ μεγάλη επιβάρυνση των προϋπολογισμών των νοικοκυριών από τις άμεσες πληρωμές για υπηρεσίες υγείας στην Ελλάδα. Στο σύνολο των νοικοκυριών, κατά μέσο όρο, οι άμεσες πληρωμές απορροφούν το 7.4% του οικογενειακού εισοδήματος, το μεγαλύτερο ποσοστό μεταξύ των έντεκα χωρών που εξετάστηκαν και το οποίο είναι τέσσερις φορές μεγαλύτερο από αντίστοιχο ποσοστό στην Γαλλία και την Ολλανδία. Το ένα τρίτο των ελληνικών νοικοκυριών των ηλικιωμένων ξοδεύει πάνω από το 5% του οικογενειακού εισοδήματος σε άμεσες πληρωμές. Το ποσοστό αυτό είναι δέκα φορές μεγαλύτερο από αυτό που παρατηρείται σε όλες τις άλλες χώρες με εξαίρεση το Βέλγιο και την Ιταλία. Τα ευρήματα αυτά καταδεικνύουν την σημαντική υπό-ασφάλιση ενάντια στον κίνδυνο της ασθένειας στην Ελλάδα, η οποία όχι μόνο μειώνει την ευημερία των ατόμων που αποστρέφονται τον κίνδυνο (risk averse) αλλά ενδέχεται να επιφέρουν έμμεσες μακροοικονομικές συνέπειες, καθώς τα νοικοκυριά

μπορεί να χρειαστεί να μεταβάλουν της καταναλωτικές και αποταμιευτικές συνήθειες.

Τα φάρμακα απαρτίζουν το μεγαλύτερο ποσοστό των άμεσων πληρωμών για υπηρεσίες υγείας σε 9 από τις 11 υπό εξέταση χώρες. Το κεφάλαιο πέντε τεκμηριώνει και εξηγεί την μεταξύ των χωρών διακύμανση στις φαρμακευτικές άμεσες πληρωμές. Εκτιμάται το υπόδειγμα δύο σταδίων (two-part model, probit και least squares) για τις φαρμακευτικές δαπάνες και ελέγχονται εκτενώς το επίπεδο υγείας και τα κοινωνικό-οινομικά χαρακτηριστικά των ατόμων. Ακόμα και με αυτούς τους ελέγχους, η ανάλυση βρίσκει σημαντική απόκλιση μεταξύ των χωρών στις άμεσες πληρωμές για φάρμακα για άτομα με την ίδια ή παρόμοια ασθένειες. Οι πληρωμές για φάρμακα είναι υψηλότερες στο Βέλγιο, την Ελλάδα, την Ιταλία και την Ελβετία και χαμηλότερες στην Ολλανδία και τη Γαλλία. Η επίδραση του εισοδήματος και της ύπαρξης διαγνωσμένης χρόνιας ασθένειες, καθίσταται δυνατό να διαφέρει στις υπό εξέταση χώρες, μέσω της εισαγωγής αλληλεπιδράσεων. Η ανάλυση αυτή καταδεικνύει διακύμανση μεταξύ των χωρών η οποία είναι συνεπής με τις διάφορες πολιτικές και την κοινωνική προστασία που παρέχεται στους φτωχούς και στους χρόνιους ασθενείς σε ότι αφορά τις δαπάνες για φάρμακα. Το έκτο κεφάλαιο συνοψίζει τα κυριότερα συμπεράσματα της διδακτορικής διατριβής.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: Introduction

1.1 Rising Pharmaceutical Expenditures

Health care spending in high-income countries has outpaced economic growth in recent decades. Spending on pharmaceuticals has been identified as a key driver of overall healthcare expenditures. Data from the Organization for Economic Co-operation and Development (OECD) show that, on average, the annual growth rate of expenditures on pharmaceuticals was 30% higher than that of total expenditures on healthcare during the 1990s (OECD, 2008). Besides this general upward trend in pharmaceutical expenditures, there is also remarkable cross-country variation in the levels of spending. For example, within the European Union (EU) in 2005 pharmaceutical expenditures as a share of Gross Domestic Product (GDP) reached 2.2% in Portugal, were 1.8% in Greece, but were only 1.0% in the Netherlands and 0.8% in Denmark (OECD Health Data, 2008).

Rising pharmaceutical expenditures are the result of both increasing utilization, driven in part by the ageing of populations, and by rising prices, which is attributable both to the discovery of new pharmaceutical treatments and by the replacement of older, cheaper medicines by new, more effective, but also higher priced, pharmaceutical products. The increase in expenditures on pharmaceuticals has become a major concern for policy makers in most European countries over that last twenty years. Pharmaceutical markets have been increasingly subjected to regulation both of the supply and the demand side. Pharmaceuticals are often targeted because they are a visible expenditure on which it is believed that cost savings can be obtained through direct intervention, and because they are less politically sensitive than a

reduction in health care services or salaries (Mossialos, Mrazek, & Walley, 2004; M. Mrazek & Mossialos, 2004). Cost-containment has been attempted through the control of prices of medicines at various levels and through measures that seek to constrain demand either by influencing the prescribing behavior of healthcare professionals or by exposing patients to financial incentives.

1.2 Drug Price Regulation

The prices of pharmaceuticals are regulated in most high-income countries with the notable exceptions of the United States and, within Europe, Switzerland. The primary goal of drug price regulation is to constrain expenditures. Direct price controls amount to the setting of fixed maximum pharmaceutical prices that are considered 'reasonable'. The definition of what is a reasonable maximum price varies from one country to another and is dependent on a number of factors, including budget limits, prescribing behavior, patterns of utilization and the importance of the pharmaceutical industry to the national economy. A variety of methods of regulating pharmaceutical prices are in operation even within the EU. The most important of which are: i) fixed pricing (set by national authorities perhaps on the basis of international price comparisons or through negotiations with the pharmaceutical companies); ii) profit controls; iii) cost-effectiveness pricing based on pharmaco-economic analysis; and, iv) reference pricing, which limits patient reimbursement to the lowest priced products within a given pharmacologic group. In most EU countries, the regulated price determines the selling price since legislation usually stipulates that a medicine may only be sold at a single price. Most of the EU countries, with the exception of Greece, are using a combination of the listed methods of regulating prices. The policy adopted depends on whether the primary objective of the regulator is to achieve the

lowest possible price as part of a cost-containment strategy, or whether it is to achieve a price level that balances industry incentives for research and innovation with cost-containment goals (Mossialos, Brogan, & Walley, 2006).

Differences in regulation policy result in different price levels of pharmaceuticals across Europe. Prices are highest in Switzerland, where, on average, price levels are 87% higher that the EU-25 average (Konijn, 2007). The next most expensive countries are Denmark, Germany, Ireland, Italy and Norway with price levels between 15-30% above the EU-25 average. Within the EU-15 member states, only France, Greece and Spain have prices lower than the EU-25 average. In Greece, prices are 27% below the EU-25 average which is the direct result of the price regulations applied. Greece uses exclusively fixed pricing and national authorities set prices using the method of international price comparisons. Until 2005, prices were set at the lowest ex-factory EU price, while since 2005 the price of a new medicinal product is set at the average of the three lowest prices among the EU-25 (two EU-15 countries and one from the 10 new member states) (Vardica & Kontozamanis, 2007).

1.3 Regulation of Demand for Pharmaceuticals

The fact that a country such as Greece, where pharmaceutical prices are among the lowest in the EU, is spending so much relative to national income on medicines, while Denmark, where prices are relatively high, is spending almost the lowest share of GDP on drugs indicates that pharmaceutical expenditures are by no means determined by prices alone. Policy makers across the EU have implemented various measures that aim to affect the utilization of pharmaceuticals by either addressing the prescribing of physicians or the demand from patients. Some of the most widely used measures are: 1) a positive (negative) list of medicines eligible (non-eligible) for reimbursement; 2) reference pricing which limits reimbursement to the price of a pharmacologically

equivalent medicine already on the market (Jacobzone, 2000); 3) monitoring and auditing of doctors' prescribing patterns and the provision of financial incentives to constrain prescribing through the operation of prescribing budgets; 4) prescribing guidelines, drug formularies and drug bulletins that provide the prescriber with evidence based information on the effectiveness and cost of drugs; 5) generic prescribing and generic substitution, where the first allows physicians to prescribing using the non-proprietary name of the drug and the second allows the pharmacists to substitute a generic lower priced drug for an identical brand-name higher priced drug.

Most EU countries, again with the exception of Greece, are using combinations of the listed measures in an effort to promote the quality of pharmaceutical care and to control expenditures. In Greece, neither cost containment nor efficiency is actively pursued through incentives provided to doctors to prescribe rationally. There are no proxy-demand measures such as budget ceilings on doctors, promotion of generic prescribing, monitoring of prescribing patterns nor prescribing guidelines to facilitate cost-effectiveness. There was an attempt to operate a positive list from 1998 until 2006. However, during its operation, physicians were given the right to prescribe excluded medicinal products on the justification that they were 'irreplaceable'. In absence of proper monitoring mechanisms, the operation of the list was undermined and it is perceived to have been ineffective in restricting pharmaceutical consumption and expenditure (Contiades, Golna, & Souliotis, 2007).

1.4 Cost Sharing and Out-Of-Pocket Payments

Cost sharing is one of the commonly applied measures intended to encourage more cost-effective utilization of healthcare and to control costs. Cost sharing mechanisms oblige the patient to finance part of the costs of the healthcare services used. In Europe, although healthcare financing derives mainly from taxation and social health

insurance, there is a shift from public to private health expenditures in almost all countries over the past two decades (OECD Health Data, 2008). Due to the restricted role of private insurance in most EU countries, the increase in private expenditures has been due mostly to increasing out-of-pocket (OOP) payments. Greece holds an extreme position with the OOP contribution reaching more than 50% of total health expenditure (THE) in 2004 (*ibid*)(OECD Health Data, 2008). Within the EU, cost sharing is more extensively used for pharmaceuticals than for other types of health care, with the exception of dental care. Private payments contribute around 30% or more of pharmaceutical expenditures in most EU-15 countries, while in half of the countries there is no cost sharing whatsoever for outpatient or inpatient care (OECD, 2008).

OOP financing of health care raises concerns about households' exposure to risk, access to effective medicines and consequent inequities, impoverishment caused by paying for healthcare, and regressivity in the financing of health care.

1.5 Thesis Outline

Growing expenditures on pharmaceuticals makes it increasingly important to understand the factors driving their consumption. With around 2% of GDP being spent on pharmaceuticals in some EU countries, they deserve the attention not only of health policy analysts but also of economists. While many of the new drugs responsible for growing expenditures offer undoubted therapeutic benefits, their cost places further pressure on straining health care budgets, which in turn have important macroeconomic and labour market consequences.

The variety of responses of policy makers across Europe to these pressures makes comparative analysis of the consumption of pharmaceuticals particularly

enlightening. There is variation in the extent to which policies have concentrated on the control of prices, or on constraining utilization, either through influencing the prescribing behaviour of doctors or by operating on the incentives to patients. While cost-sharing is more common throughout Europe for pharmaceutical expenditures than for other health care, there is substantial variation across the continent in the burden of out-of-pocket payments for medicines on households budgets, with the result that the financial risks associated with given health conditions vary tremendously from one country to another.

Analysis of the consumption of pharmaceuticals is of particular relevance to Greece. Despite relatively low prices, pharmaceutical expenditures are relatively high as a share of GDP, a reflection of the high levels of utilization. Pharmaceutical policy is relatively weak in comparison with other EU countries, with a reliance on direct price controls and an absence of incentives for doctors, pharmacists and patients to constrain consumption and to use cheaper, pharmacologically equivalent generic substitutes. The health care system is one of the most privately financed among the EU-15, with OOP payments, including those for medicines, contributing more than half of all health care financing of the healthcare, leaving households exposed to the risk of excessive financial strain in the event of illness.

The primary motivation for this thesis derives from the situation with respect to the utilization of, and expenditures on, pharmaceuticals in Greece. But the analysis is not confined to Greece. Rather, most of the analysis is comparative across European countries. The general aim is to identify European variation in the consumption of pharmaceuticals and to learn from this through interpretation in light of differences in policies adopted. From a Greek perspective, the analysis is intended to highlight how Greece differs with respect to utilization of pharmaceuticals and the

burden of expenditures on them and, in doing so, help identify directions for policy that promise more cost-effective, but also equitable, patterns of consumption of medicines.

Each of the four main chapters presents a self-contained analysis but they are linked through examination of the issues identified above with respect to the utilization of and expenditures on pharmaceuticals. One of the chapters (4) examines all household direct spending on health care, but one of the main points of this analysis is to draw attention to the importance of pharmaceuticals to total OOP payments for health care made by households. Three of the chapters (3-5) make use of data from the Study of Health, Aging and Retirement in Europe (SHARE). This European collaborative research effort collects data on samples of the population aged 50 and above in 11 countries. It provides detailed data on incomes, health status and health care utilization, among other topics. Its strongest attribute is that it is designed to produce data with a high degree of comparability across countries. This is what makes the comparative analyses presented in the thesis feasible, and informative. For example, I am able to examine how drug treatments for given medical conditions vary across Europe and how household spending on those treatments varies.

Very briefly, the thesis is organized as follows. In the second chapter, I investigate the impact of price regulations in Greece on aggregate pharmaceutical expenditures. In the third chapter, I turn to pharmaceutical utilization, using individual level data to identify the factors that account for cross-country variation in the pharmacologic treatment of given medical conditions. In the fourth and fifth chapter, I address the issue of out-of-pocket payments, first by assessing their impact on households' living standards and then by exploring cross-country variation in out-of-pocket payments for pharmaceuticals. Each of these chapters is summarized below.

In chapter 2, I assess the extent to which a policy of price controls has been successful in constraining the growth of pharmaceutical expenditures in Greece. Unlike most of EU countries, which use a combination of measures to regulate prices, Greece relies solely on fixing prices on the basis of the lowest prices prevailing in the EU. This policy has been relatively successful in constraining the price of pharmaceuticals but not pharmaceuticals expenditures. The rate of increase in pharmaceutical expenditures in Greece over the last two decades has been particularly rapid, more than doubling in real terms, and being surpassed only by that in Ireland within the EU. The chapter argues that this is due to the reliance on price controls and the absence of polices to promote cost-effective prescribing by doctors and to constrain utilization by patients. The relative impotence of price controls is established by decomposing the growth in aggregate pharmaceutical expenditures into the contribution of changes in prices and in quantities of given pharmaceuticals, and that of the switch to new and more expensive drugs. Comparisons with other European countries further helps identify why expenditures have continued to increase despite the price control measures introduced.

Chapter 2 establishes that the patterns of prescription and utilization of pharmaceuticals is the most important determinant of expenditures on them. In chapter 3, I directly examine the utilization of pharmaceuticals with the aim of explaining why their utilization varies so much across Europe. Throughout the continent spending on pharmaceuticals is a strong contributor to rising health care expenditures, but there is also remarkable cross-country variation in the levels of spending, which, in turn, reflect variation in utilization. The analysis identifies the relative contribution of population, health care organizational and cultural factors to the cross-country variation in the utilization of prescribed pharmaceuticals. At a time

when policy makers are eager to find ways of constrain pharmaceutical expenditures, the analysis helps determine the extent to which differences in pharmaceutical utilization are the result of policy choices, rather being attributable to population health needs or less amenable cultural factors. This is done using a variance decomposition method applied to survey data from SHARE.

I argued above that OOP financing of pharmaceuticals and other health care can have an important impact on the welfare of households by leaving them exposed to uninsured risks. This should be a particular concern in Greece, which is unique among the EU-15 countries in the extent to which it relies on OOP payments to finance healthcare. Chapter four, again using the SHARE data, documents the extent and distribution of the burden of OOP payments for healthcare relative to household income incurred by older Greek households and compares it with those incurred in other EU countries. The burden of health payments incurred by the older population is of particular interest as health care needs are greatest for this population. Cross-country comparisons of the elderly population are particularly interesting due to the fact that reimbursement policies and social protection mechanisms in old age differ across countries. The chapter uses the concept of catastrophic payments for health care and approximates them through the OOP budget share.

One of the findings of chapter 4 is that payments for pharmaceuticals are a very large component of total OOP payments for all health care. The fifth chapter takes the analysis of OOP payments for prescription drugs further, documenting and explaining their cross-country variation. The objective of the analysis is to investigate the extent to which differences in OOP expenditures on pharmaceuticals reflect cross-country variation in healthcare systems, reimbursement mechanisms and cost-sharing policies. This is of particular interest as health care systems around Europe recognize

equitable access to pharmaceuticals as a priority. The analysis of the SHARE data controls for population differences in health and socioeconomic characteristics and so identifies the extent to which older Europeans with the same health needs and socioeconomic circumstances are exposed to dissimilar risk of paying for drugs out-of-pocket. The analysis also investigates whether cross-country variation in the risk of paying for drugs is related to social protection policies.

The final, concluding chapter summarises the most important findings of the research and considers the implications for policy and future research arising from them.

CHAPTER 2: The Impotence of Price Controls: Failed Attempts to Constrain Pharmaceutical Expenditures in Greece

2.1 Introduction

Expenditures on pharmaceuticals are increasing in most developed countries. Greece has been relatively successful in constraining the price of pharmaceuticals, which are among the lowest in the European Union (EU), but not pharmaceuticals expenditures, which, by European standards, are high as a share of national income and total expenditure on health (OECD Health Data, 2008). The rate of increase in pharmaceutical expenditures in Greece over the last two decades has been particularly rapid, more than doubling in real terms, and being surpassed only by that in Ireland within the EU. Most of the cost of prescription drugs is covered by public insurance and so the rate of increase in expenditures is placing an additional burden on already severely strained social insurance funds.

Policy efforts to contain healthcare expenditure in Greece have focused on controlling the price of pharmaceuticals. But the reimbursement system provides little incentives for physicians and patients to be price conscious in their prescription and consumption of medicines ([Tragakis & Polyzos, 1996a]; Tragakis & Polyzos, 1996b). This paper analyses trends in pharmaceutical expenditures in Greece, drawing comparisons with other European countries and examining why expenditures have continued to increase despite the cost-containment measures introduced. It is argued that extensive price controls have not been effective in suppressing rising pharmaceuticals expenditures. Through decomposition of data from the largest social

insurance fund (I.K.A.), which covers more than half of the population, the effect on aggregate drug expenditures of the switch to new and more expensive drugs is determined by eliminating the effects of changes in prices and quantities. This reveals that 312% of the rise in real drug expenditures is attributable to the adoption of new and more expensive products. While there are undoubted therapeutic benefits from the adoption of new technologies, these could be realized more cost effectively if there were stronger incentives to promote the prescription and use of generics.

The following section describes features of the Greek pharmaceutical market, health sector and policy reforms that are most relevant to pharmaceutical expenditures. In the third section, the rise in drug expenditures is described and explained through decomposition of the increase into the contribution of changes in prices, in volumes and a product-mix effect of pharmaceuticals prescribed. Drawing on this analysis, policy implications are discussed in the final section.

2.2 Pharmaceutical Market and Policy in Greece

2.2.1 The Pharmaceutical Industry and Retail Market

Greece differs from the majority of EU member states in that, until 1998, it had no proper recognition of intellectual property and thus drug patents. The absence of strong patent protection strengthened the bargaining position of the government relative to foreign research-based companies because any new drug could potentially meet competition, soon after its introduction, from copies produced by non-research companies. However, the domestic pharmaceutical industry did not fully exploit this situation, missing an opportunity to increase its market share.

The pharmaceutical market has become heavily dominated by imported medicines. In 1987, domestically produced products accounted for 75% of total sales

and imported products only for 18% (Geitona, Zavras, Hatzikou, & Kyriopoulos, 2006). By 2003 imported products had become dominant in the market, accounting for 70% of sales. The main trading partners for pharmaceuticals are other EU countries, which account for 80% of total trade (Κουσουλάκου, 2004; EFPIA, 2007). The trade deficit in the pharmaceutical sector has increased from just under €1 billion in 2000 to €1.6 billion in 2005. In contrast, most of the EU-15 countries generate a substantial trade surplus, with Spain being the only country with a trade deficit greater than Greece (EFPIA, 2007).

Greece has the highest number of pharmacists per capita in the E.U., with one for every 1,145 people versus an E.U. average of 5,348 in 2004 (OECD Health Data, 2008). Pharmacists hold a monopoly over the sale of medicinal products. Until 1997, all licensed pharmacists were allowed to open a pharmacy, provided a minimum distance of 100 meters between pharmacies was maintained. From 1997, the number of pharmacies is also restricted in relation to population. According to the most recent law (Νόμος υπ' αριθ. 3457, Μεταρρύθμιση του Συστήματος Φαρμακευτικής Περίθαλψης, 2006;), pharmacies are limited to one per 1.500 individuals with a minimum distance between pharmacies ranging from 100 to 250 meters depending on the population of the municipality. Although there has been great resistance against these measures by pharmacists' associations, they are much less restrictive than those operating in other EU countries. For example, in Portugal the minimum distance between pharmacies is set at 500 meters while the population ratio is one pharmacy for every 4,000 inhabitants[1]. Similarly in France, the demographic criteria for the establishment of a

[1] Before 2007 there was a very restricted regulation, with the following criteria: the pharmacy must be owned by a pharmacist, there were geographic and demographic restrictions for the establishment of a new pharmacy and pharmacy chains were not allowed, In 2007, there was a huge reform: the property of pharmacies is now allowed to a single person or commercial society (not only to pharmacists), the technical director does not need to be the owner of the pharmacy but must be a pharmacist in

new pharmacy are one pharmacy i) per 3,000 inhabitants in cities with over 30,000 inhabitants, ii) per 2,5000 inhabitants in cities of less than 30,000 inhabitants (van Ganse, Chamba, Bruet, Becquart, & Stamm, 2007). The high density of pharmacies in Greece is also attributable to their primacy as a source of employment for pharmacists given the ever-decreasing size of domestic production of medicinal products. The pharmacist's margin as a proportion of retail price (VAT included) is 24%, which approximates the European average (Paterson, Fink, & Ogus, 2003). Such high profit margins, together with monopoly rights, help sustain the large number of pharmacies, which, in turn, may fuel excess consumption of pharmaceuticals through an "availability effect" (Carlsen & Grytten, 1998; Carlsen & Grytten, 1998)(Birch, 1988); (Madden, Nolan, & Nolan, 2005).

Over-the-counter (OTC) products are only available through pharmacies and are not reimbursed by social insurance funds. In 2004, the sales of non-prescription products made up only 8.3% of the total pharmaceutical market—half the EU average and greater only than the share in Portugal. OTCs are legally recognized as a separate product category from prescription-only medicines and although their prices should not follow the rules governing Rx products, they are nonetheless under strict control, with prices fixed using the same methodology as for prescription products, and criteria specified for products that can be marketed as OTCs. Despite the legal distinction between OTC and Rx products, it is common practice in Greece for the majority of prescription medicines to be purchased without a prescription. With the exception of narcotics, there is no explicit legal framework that prohibits pharmacists from selling medicinal products without prescription. The definition "prescription

---

exclusivity, pharmacies are allowed to dispense pharmaceuticals through the internet and home deliveries (Teixeira & Vieira, 2008). Relevant liberalizations of the pharmacy profession are still pending in Greece.

medicine" mainly refers to the reimbursable status of the products. This constitutes one of the main reasons why the OTC market remains relatively small (AESGP, 2008; AESGP, 2008).

2.2.2 Cost-Containment Policies

Greece, like most European countries, has responded to increasing pharmaceutical expenditures by seeking to control the prices of pharmaceuticals (Silvio, 1998); (Lopez-Casasnovas & Puig-Junoy, 2000); (Ioannides-Demos, Ibrahim, & McNeil, 2002); (M. F. Mrazek, 2002); (Ess, Schneeweiss, & Szucs, 2003). There is evidence to suggest that these measures have not produced significant savings and had either a one-off or a negligible impact (Karokis, Christodoulopoulou, Tsiaras, & Mossialos, 2000);(Λοπαντατζίδης et al., 2001; Λοπαντατζίδης, Χατζηανδρέου, & Νεκράριος, 2001).

Patients' Cost-Sharing: In Greece, membership of a social insurance fund is compulsory for the employed population and its dependants, and is based on occupation. Up to 1990, all insured individuals could procure medicinal products in pharmacies free of charge. Since 1992 a system with three co-payments levels, uniform for all insurance funds, has applied. Co-payments are made directly by the patients to pharmacists at a general rate of 25%. Low-income pensioners entitled to cash benefits (EKAS) pay a reduced rate of 10% and this is also applied to medicines for various chronic diseases, e.g. Parkinson's disease, insipidus diabetes, chronic pulmonary cardiopathy, coronary disease, osteoporosis, myopathy, tuberculosis and asthma. Medicines used for the treatment of industrial accidents, obstetric care, life-threatening illnesses and certain chronic illnesses (insulin for diabetes mellitus, psychosis, epilepsy, haemophilia, and drugs regulating the immune system) are exempt from co-payments. Moreover all uninsured and needy individuals are entitled to pharmaceutical care free of charge and procure the medicinal products directly

from public hospitals. The introduction of co-payments does not appear to have made a significant impact on pharmaceutical expenditures, which have continued to rise. This can probably be attributed to the low prices of pharmaceuticals, such that a 25% co-payment amounts to a fairly modest payment.

Restrictions On and Incentives for Prescribing Behaviour: In an effort to control rising pharmaceutical expenditures most European countries have implemented regulatory measures to target physicians' prescribing behaviour and promote generic prescribing. These measures comprise: a) the prescription of medicines using the generic name, which is being used in Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and the UK; b) prescription budgets, which are implemented in the UK, Germany, Ireland and Italy; c) pay agreements linked to prescribing; d) dissemination of information to promote the use of generics; e) prescribing guidelines; and, g) prescribing monitoring. International experience suggests that such measures can reduce the prescription of drugs with ambiguous effectiveness, promote prescription of generic drugs and reduce overall pharmaceutical expenditures (Volker & Eberhard, 1996). In Greece, there are no specific procedures in place regulating doctors' prescribing and encouraging the use of generic drugs. In 1996-7, a pilot program sought to monitor electronically the prescribing patterns of physicians in several hospitals and a hospital formulary based on active ingredients was designed for adoption by all public hospitals. However, both projects were never fully implemented and are no longer in use. In the absence of an integrated computerized system, there is no effective monitoring of individual doctors' prescribing patterns and therefore little existing information on them.

Generics constitute only 9.7% percent of the Greek pharmaceuticals market, which is low compared to most EU countries: Netherlands (17.3%); Denmark

(20.4%); UK (23.3%); Germany (31.1%). Until 1997, prices of generics exceeded 86% of the retail price of the equivalent original product. Since then, prices are set at 80% of the original product, which is consistent with other EU countries like Portugal, Italy and Belgium where generics must be at least 20% cheaper than original products. In a number of EU countries (Denmark, Finland, France, Norway, Spain) generics are mainly promoted through substitution by pharmacists, although in most cases pharmacists can only select the multi-source drug if the prescription is written using the generic name. Financial incentives directed at pharmacists such as the use of preferential margins on generic products (Spain, France, the Netherlands and Norway) or fixed dispensing budgets (Denmark) are also being used. In Greece, generic substitution is prohibited and pharmacists' profits are directly linked to the price of the product dispensed, providing a disincentive to issue cheaper medicines.

Positive List: In most European countries, the "list" defining the drugs eligible for reimbursement comprises one of the primary measures to constrain demand. For example, in France positive listing of drugs is being conducted according to the products' medical value, the prices of comparable medicines and the reduction in costs of medical treatments. In Italy, a positive list was first introduced in 1978 while major revision and de-listing took place in 1994. In Portugal, a positive list is in effect while "cost-benefit" evidence is submitted in order to support reimbursement. In Spain, a negative list is employed with listing of products conducted according to pharmaco-economic criteria (Jacobzone, 2000). In Greece, a positive list that was uniform for all insurance funds was introduced in 1998. To be included on the list, drugs had to meet the following criteria: 1) the product should already be marketed in 3 of the following countries: France, Germany, Sweden, Switzerland, UK and USA; 2) a market authorization should have been granted in Greece; and, 3) the cost of

treatment should not exceed a recommended reference price. Cost-effectiveness standards and criteria like adverse effects or counter indications were not taken into account. The only actual criterion adopted has been the product's average daily treatment cost, which in effect forced companies to further reduce prices of several products (Τερζή, 1999). As a result, several high price products have been excluded from the list, despite the fact that due to increased effectiveness they could have constituted a cheaper treatment option (Contiades et al., 2007). Additionally, doctors had the right to prescribe drugs outside the list and require that the patient be reimbursed simply by completing a form verifying that the excluded product was "irreplaceable". In the absence of strict control mechanisms, almost all products with market authorization were reimbursed and the effort to control prescribing was undermined. The positive list resulted in a one-off reduction in the level of pharmaceutical expenditures but had no long-term impact on their rate of growth (Karokis et al., 2000; Λοπαντατζίδης et al., 2001). The positive list was abolished in May 2006 and all prescribed medicinal products are now reimbursed with no exception.

Price Control: The authority that regulates pharmaceutical prices is the Directorate of Prices and Medicinal Products of the Ministry of Development. Different pricing procedures apply to imported and domestically produced/packaged pharmaceutical products. Regarding imported drugs, up to 1997 the price was fixed at the average of the three lowest wholesale prices among EU countries. From 1997 until end of 2005, the lowest ex-factory EU price for the same molecule was imposed on imported products, a reform that resulted in great reductions in prices. From December 2005 onwards prices are fixed at the average of the three lowest prices in the EU, with two of the three from the EU-15 countries plus Switzerland and the remainder from the 12

New Member States. The price of domestically produced pharmaceuticals is calculated from actual production cost plus a profit margin of 12.5%. Subsequently, this price is compared to the lowest price for the equivalent medicinal product in EU; the latter works as an upper limit and should not be exceeded. The low prices resulting from these restrictions have encouraged substantial parallel exports from Greece, which have been estimated at €1.2 billion in 2004 (Κουσουλάκου, 2004).

In summary, currently in Greece, neither cost containment nor efficiency is actively pursued through incentives provided to doctors to prescribe rationally. There are not proxy-demand measures such as budget ceilings on doctors, promotion of generic prescribing, utilization reviews, prescribing practices monitoring or prescribing guidelines to facilitate cost-effective prescribing. All the attempted policies changes in Greece have focused on drug pricing, the positive list and some co-payments. However, evidence from other European countries suggests that pressure on price without pressure on volume does succeed not in containing overall expenditures (M. Mrazek & Mossialos, 2004).

2.3 Pharmaceutical Expenditures

2.3.1 Level and Trend in Pharmaceutical Expenditures

According to the latest available OECD data (OECD Health Data, 2008), real pharmaceutical expenditure in Greece increased more than twofold from €569 million in 1991 to €1303 million in 2004, or an annual average increase in real terms of 7% (see Table 2.1). In each year, the annual rate of growth in expenditure on drugs exceeded that for total health expenditures. The percentage increase was lower in the sub-period from 1991 to 1997, when the annual average increase was 6.2%, whereas the annual average increase was 11.2% after 1998 (see Figure 2-I). Between 1997 and

1998 there was an 11.9% decrease in real drug expenditures, which was mainly attributable to the new pricing policy that fixed prices of imported products at the lowest price in the EU but also to the fact that from July 1996 to September 1997, due to absence of pricing decisions, no new medicines were licensed for reimbursement (Kontozamanis, 2001).

Table 2.1: Expenditure on Pharmaceuticals in Greece, 1991 to 2004

Year	Real Drug Exp. (million €)	Drug exp. % of GDP	Drug Exp. % of total health exp.	Private. Drug Exp. % Total Drug Exp.	Public Drug Exp. % Public Health Exp.
1991	569	1.1	16.3	38.1	18.9
1992	648	1.2	17.0	35.6	20.0
1993	695	1.3	16.6	32.6	20.5
1994	755	1.4	16.1	31.5	21.9
1995	757	1.4	15.7	29.1	21.4
1996	788	1.4	16.1	26.7	22.3
1997	814	1.4	16.2	25.4	22.9
1998	717	1.2	13.9	30.0	18.6
1999	796	1.2	14.4	29.9	18.9
2000	893	1.4	17.8	32.2	19.8
2001	986	1.4	16.3	24.7	19.2
2002	1096	1.4	16.8	17.9	21.7
2003	1222	1.5	17.8	18.2	23.2
2004	1303	1.6	19.7	17.9	26.2

Source: Authors' estimates based on data provided by the National Statistical Service, Foundation for Economic and Industrial Research (IOBE) and OECD Health Data 2008.

The increase in real pharmaceutical expenditures in Greece has outpaced that witnessed in any other EU country over the last two decades (with the exception of Ireland). In countries with relatively high prices, real drug expenditures increased by an average of 63% between 1991-2004 compared with 129% in Greece (Figure I). For the countries that, like Greece, have relatively low prices, the average increase was

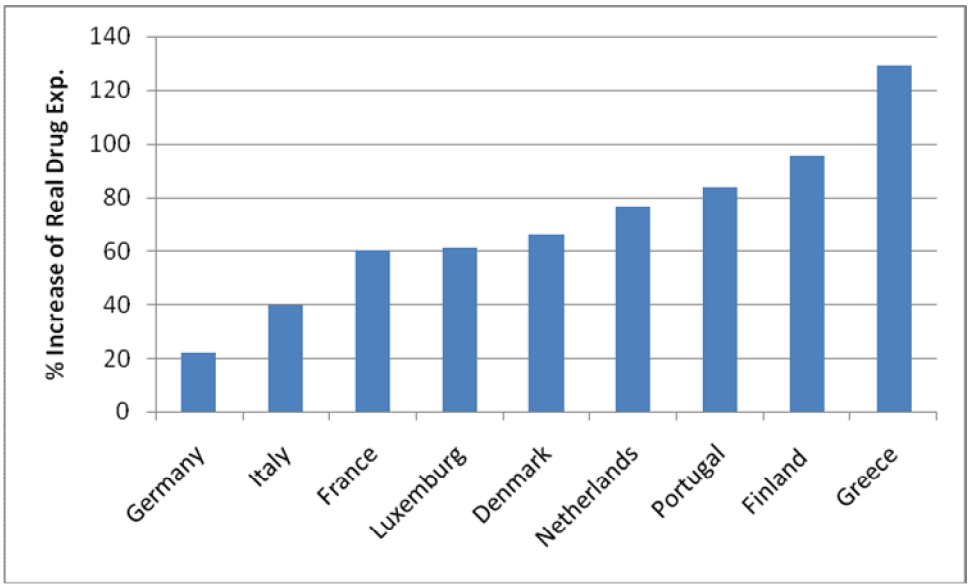
61%[2]. For the study period the EU average percentage increase in real drug expenditures for the countries with available data was 70%.

Expenditures on drugs as a share of GDP grew from 1.1% in 1991 to 1.6% in 2004. The latter figure is exceeded only by Portugal (2.2%), Spain (1.9%), Italy (1.8%) and France (1.9%) among the EU-15. Greece devotes a larger share of its total spending on health to pharmaceuticals (19.7%) than the European average (16%).

In 2004, public spending accounted for 82% of total pharmaceutical expenditures which is the third highest among EU-15 countries. Public spending on pharmaceuticals accounted for 26% of public health care expenditures, which was the highest share among EU-15 countries, with the European average being only 14%.

[2] Real drug expenditures increased by 76% in the Netherlands, 22% in Germany, 66% in Denmark, 95% in Finland, 61% in Luxembourg while in countries with relative low prices of pharmaceuticals real drug expenditures increased by 40% in Italy, 60% in France and 83% in Portugal.

Figure 2-I: Percentage Increase of Real Drug Expenditures Between 1991-2004



for Different European Countries

Source: OECD Health Data 2008

2.3.2 Explaining the Increase in Pharmaceutical Expenditures

Despite the low prices of pharmaceuticals in Greece, it is clear that by European standards spending on pharmaceuticals is high relative to national income and total spending on health care, and that the rate of increase in drug expenditures over the last two decades has been particularly rapid. Escalation of pharmaceutical expenditures may be broadly attributable to increases in the prices of given products, increase in the consumption of those products and/or a switch in the composition of consumption toward new and more expensive therapies. The introduction of new drugs can result in substitution between classes of drugs or between drugs within the same class to treat similar conditions. Provided there is a difference in price, any substitution will have an impact on drug expenditures. From 1996 to 2002, the number of original products introduced per year increased from 148 to 229, while at the same time the median value of new products almost doubled (Contiades et al., 2007). In the same period, the number new entries of generics decreased from 162 to 98. It has been claimed that

since 2000 many pharmaceutical companies substitute older products with new, more expensive ones in order to offset the impact of pricing policies and the introduction of the positive list (Σουλιώτης, 2002).

Using the methodology introduced by Gerdtham et al (1993) and extended by Dubois et al (2000)[3], we decompose the increase in real drug expenditures into a price effect, a volume effect and a product mix effect. This is done using data on drug expenditures financed from the largest social insurance fund (IKA), which covers half of the population and accounted for 31% of total spending on drugs in 1991 and 36% in 2003[4]. IKA is the only social insurance fund with a developed computerized system and a comprehensive database for the whole study period including data on the number of doctor visits, number of prescriptions written, the volume of prescribed drugs and an associated price index Such information is lacking for all prescription medicines in the country since the data on the expenditures and volumes include parallel exports and so fail to reflect domestic consumption. Real spending on drugs by IKA increased from €177, 6 million in 1991 to €435,4 million in 2003, an increase of 145.7%. Like the aggregate national trend, the percentage increase was lower in the sub-period from 1991-97, when the annual average increase was 6.1%, and higher since 1998 at an average of 15.7% per annum.

The unit of quantity is defined as the number of drugs prescribed. Daily Defined Doses (DDDs) would be preferable but are not available for the entire period. Real drug expenditures are calculated by dividing the nominal pharmaceutical expenditures by the overall price index for consumer goods and services. The relative

[3] See (Jonsson, 1994); (Marchant, 1997); (Lopez Batista & Mossialos, 2000); (Dabra, 2003); (Gerdtham & Lundin, 2004)] for similar analysis.

4 The analysis was restricted up to the year 2003 as data for later years are not available.

price of drugs is calculated by dividing the price index of drugs by the consumer price index.

Decomposing the change in real drug expenditure into that explained by changes in the price and quantity indices leaves a residual that is due to failure of these indices to accurately measure changes in price and quantity. One problem in constructing a relevant price index for drugs is the rapid introduction of new drugs. When a drug first enters the market it will be excluded from the standard price index for the simple reason that there is no price available at the base period with which the price of the new drug can be compared. Subsequently, the new drug enters the price index in the second period i.e. when price data for two successive periods are available. Further problems arise due to the rapid change in the mix of drugs and the lack of an adequate measure that captures changes in quality (Berndt, Griliches, & Rosett, 1993; Gerdtham, 1997). These limitations imply that changes in real drug spending do not correspond to changes in the retail price index multiplied by any quantity index. The residual part of real drug expenditure is basically a measure of the effect of changes in drug treatment patterns on spending. If the residual is more than 100, it indicates that consumption has shifted toward usage of more expensive drugs (Gerdtham et al.,1998). This residual is calculated by dividing the index of real drug expenditure by the product of the price and quantity indices.

The figures presented in Table 2.2 show that real drug expenditures increased by 146% between 1991 and 2003 despite a decrease of 55% in real prices. The number of drugs prescribed increased by only 32%, not enough in itself to fully compensate for the fall in prices and account for the observed rise in real spending. Thus, it is the residual that accounts for most of the rise in spending. In fact, the residual increased by 312% over the period. It had increased by 98% by 1999 and

increased by 25% in 2000 and by another 26% in 2001. From 1998 onwards (coincident with implementation of the positive list and the new pricing policy) there has been a significant decrease in the growth rate of pharmaceutical consumption; in fact, drug consumption remained almost stable between 1998 and 2003. Prices of pharmaceuticals decreased by 13%. Remarkably, during the same period, pharmaceutical expenditure increased by 107% and the residual increased by almost 137%, clearly suggesting that doctors have moved toward the prescription of more expensive drugs. This shift is consistent with the claim that pharmaceutical companies gradually withdrew older and cheaper drugs and substituted them with new and more expensive medicines in order to countervail the negative effects of the pricing policy and the positive list.

Table 2.2: Real Pharmaceutical Expenditures, Prices, Quantity and Product Mix Residual in Greece, 1991-2003 (IKA Insurance Fund)

Year	Real Drug Exp. (million €)	Real Spending [a]	Real Prices [b]	Quantity [c]	Residual [d]
1991	177.6	100	100.00	100	100.00
1992	199.4	112.51	93.92	103.55	115.68
1993	221.3	124.91	89.024	107.85	130.09
1994	227.6	128.44	87.59	111.45	131.56
1995	222.3	125.44	80.80	116.84	132.86
1996	239.6	135.22	74.68	128.67	140.70
1997	251.9	96.62	46.08	133.91	156.56
1998	210.4	118.68	51.71	131.98	173.90
1999	236.1	133.24	49.93	134.36	198.60
2000	287.7	162.38	48.40	134.43	249.52
2001	327.2	184.67	46.82	125.25	314.86
2002	369.6	208.59	45.59	128.36	356.42
2003	435.4	246.29	45.21	132.22	411.93

a Real drug expenditure index, 1991–2003: nominal drug spending divided by consumer price index, standardised to 1991=100 (A)

b Retail price index for pharmaceuticals divided by consumer net price index, standardised to 1991=100 (B)

c Quantity index, 1991–2003 (C).

d Residual =A/ B * C)/100*100

2.3.3 Comparison with Other EU Countries

The relative importance of the product mix or residual effect in explaining the rise in real drug spending is broadly consistent with analyses of other countries. In Sweden, real drug expenditure increased by 67% between 1974 and 1991, while relative prices of drugs fell by 30% and the number of prescriptions increased by 11% (Gerdtham et al., 1993). As the residual increased by 115%, it was concluded that the switch to more expensive drugs is the most important driver of rising pharmaceutical expenditures. In Spain, between 1980 and 1996 although the relative price of drugs decreased by 39% and the number of items prescribed increased only by 10%, real drug expenditures increased by 264%, implying a 442% increase in the residual (Lopez-Casasnovas & Puig-Junoy, 2000). In British Columbia, Morgan et al (Morgan, Agnew, & Barer, 2004) focused on outpatient prescription drugs use among the

elderly and concluded that changes in the mix of therapies explained over half of the observed drug expenditure increase, while increases in the elderly population did not have a strong impact.

But changes in product mix are not the main upward pressure on pharmaceutical expenditures in all countries. For example in Germany, real expenditures increased by 21% between 1992 and 2003, relative prices increased by 4% and quantity (measured by Defined Daily Doses (DDDs)) by 30%, leaving a negative residual contribution of 11%, which captures the change in overall price per DDD that is attributable to changes in treatment patterns.[5] This contrasting result suggests that there has been substitution of cheaper for more expensive drugs, exerting a downward pressure on total expenditures. This is consistent with the fact that Germany is one of the countries with the largest generic market (>30%) and heavily promotes the use of generics and rational prescribing (EFPIA, 2007). Prescriptions are written using the generic name and generic substitution is permitted since 1989. There is auditing and benchmarking of prescribing behavior of physicians, while prescribing budgets for physicians and a negative list based on pharmacological criteria have been enforced since 1991.

Further comparative analysis can be conducted for a shorter time period (2000-2004) for five EU countries (Belgium, Denmark, Finland, Germany and Portugal) in addition to Greece using the OECD Health Data (OECD Health Data, 2008).[6] DDDs are used as the measure of volume. Results are presented in table III. For Greece, these data show an increase in real expenditures of 40% over the four year period, greater than any of the comparator countries but a little less than the 51%

[5] This analysis has been conducted using the OECD Health Data, 2008.

6 Pharmaceutical consumption data are not available for all of these countries for a longer time period.

increase in real expenditures on IKA enrollees (see Table 2.2). Relative prices decreased by 10% and the quantity component increased by 31%, leaving a residual contribution of 18%, which is much lower than that obtained using the IKA data over the same period (65%). Some of this discrepancy may be due to the difference in the measure of volume—DDDs versus number of drugs—but it is also due to the inclusion of parallel exports and drugs used in hospitals in the OECD data that substantially inflate the increase in quantity. Between 2000 and 2004 it is estimated that parallel exports grew from €300 million to €1.2 billion (Kousoulakou & Fragoulakis, 2004).

So, the OECD data are likely to understate the extent to which rising pharmaceutical expenditures in Greece are driven by changes in prescribing patterns toward newer, more expensive drugs. Despite this, the product mix residual is considerably larger than in any of the comparator countries. After Greece, real expenditures increased most in Finland (30%), but this can be explained completely by rising prices and volumes, the product mix residual is zero. In Finland generic prescribing was introduced in 1996 and became mandatory since 2003, when generic substitution was introduced (Peura, Rajaniemi, & Kurkijärvi, 2007). The generic share of the market was estimated to almost 44% in terms of volumes and 18.4% in terms of values in 2004, while only pharmaceutical products that are included in the positive list are being reimbursed (Peura et al., 2007). Increases in expenditures are more modest in Belgium and Germany, and the residuals are actually slightly negative. Policies that constrain prescribing behavior in Germany have already been mentioned. In Belgium, although there are not budgetary constraints for doctors, monitoring of prescribing is systematically carried out and doctors receive feedback about their prescribing patterns (de Swaef & Antonissen, 2007). The residual is 7% in Portugal,

accounting for half of the increase in real spending but still much less than that in Greece. Since 2000, pharmacist in Portugal are obliged to dispense the cheapest generic (unless the doctor explicitly states otherwise), while physicians are obliged to prescribe using the International Non-proprietary Name (INN) since 2002 (Teixeira & Vieira, 2008). After Greece, Denmark has the largest residual (11%). This is despite several policy initiatives to contain expenditures, such as mandatory generic substitution and monitoring the use of pharmaceuticals in regional health authorities. Failure of these cost-containment measures has been attributed mainly to the wider use of new and expensive drugs (Strandberg-Larsenet al., 2007).

Overall, this comparative analysis reveals that pharmaceutical expenditures are rising faster in Greece than in other EU countries and the contribution changing product mix toward more expensive drugs is greater than elsewhere. The relative position of Greece and the differences observed across the other countries are consistent with differences in the policies that have been adopted to constrain prescribing behavior and the promotion of generic substitutes.

Table 2.3: Pharmaceutical Expenditures, Prices, Quantities and Product Mix Residuals in Greece and Comparator EU Countries 2000-2004

	2004 index value relative to 2000 base year of:			Product Mix
Country	**Real Spending [a]**	**Real Prices [b]**	**Quantity [c]**	**Residual [d]**
Belgium	114.46	96.88	118.75	99.49
Denmark	119.12	87.50	120.60	112.88
Finland	129.96	108.4	119.47	100.30
Germany	105.97	109.20	99.29	97.73
Greece	139.51	90.26	131.18	117.83
Portugal	113.37	86.77	121.50	107.53

a Nominal drug spending divided by consumer price index (A)
b Retail price index for pharmaceuticals divided by consumer net price index (B)
c Defined Daily Doses (C).
d A/ B * C)/100*100

2.3.4 Explanation of the Increase in the Volume of Prescriptions

For the IKA population, we identified a 32% increase in the volume of drugs prescribed between 1991 and 2003. This increase can be explained by decomposing the number of drugs prescribed into the number of prescriptions per outpatient doctor visit, the average number of visits in the IKA insured population and the size of this population, as follows:

$$\text{Prescriptions} = \frac{\text{Prescriptions}}{\text{Visits}} \times \frac{\text{Visits}}{\text{Insured population}} \times \text{Insured Population}$$

This allows us to determine the extent to which the change in the volume of prescribed drugs is due to: i) doctors dispensing more prescriptions; ii) the population referring more frequently to doctors; or iii) the insured population expanding. This reveals that the 36% increase in the number of prescriptions issued was almost totally driven by an increase of 34% in the number of prescriptions issued per visit. The number of visits among the insured population decreased by 3%, while total insured

population increased by 5%. Taking this together with the large contribution of the change in the product mix suggests that rising pharmaceutical expenditures in Greece is being driven by physicians' prescribing behavior. They are prescribing more but of even greater importance, they are prescribing more expensive drugs. Although available data do not allow for an aging affect to be estimated, evidence in the literature (Van Tielen, Peys, & Genaert, 1998) suggests that population aging plays only a minor role in the rise of pharmaceutical expenditures.

Table 2. 4: Decomposition of Change in Number of Prescriptions Issued to Social Insurance Fund (IKA) Population, Greece 1991-2003

Year	Number of Prescriptions	Prescriptions/Visits	Visits/Population	Population
1991	100	100	100	100
1992	104.12	101.38	100.56	102.13
1993	108.20	102.91	101.29	103.79
1994	112.26	105.06	102.09	104.66
1995	119.28	113.53	99.42	105.68
1996	130.98	116.71	106.73	105.14
1997	135.56	124.73	103.09	105.43
1998	135.79	130.06	98.85	105.62
1999	138.74	136.07	96.30	105.87
2000	136.63	129.83	99.60	105.66
2001	129.15	131.17	93.28	105.55
2002	130.31	132.38	93.75	105.00
2003	136.56	134.32	97.00	104.80

2.4 Discussion

Between 1991 and 2003 real spending on pharmaceuticals by the largest social health insurance fund in Greece (IKA) increased dramatically by 146%, despite a 55% decrease in the relative price of drugs. Our analysis reveals that that a 32% increase in the volume of drugs prescribed contributed to this substantial rise in spending but that the largest part (312%) of the increase is attributable to changes in the composition of drugs prescribed. The dominance of the product-mix effect and the fact that the quantity effect is driven almost entirely by an increase in the number of prescriptions

issued per visit suggest that rising pharmaceutical expenditures is mainly determined by physicians' prescribing behavior.

Most of the attempts by Greek governments to constrain pharmaceutical expenditures have focused on drug pricing and the positive list. The latter was neither properly implemented nor monitored, and its regulatory framework was continuously breached. If anything, it had a one-off effect on the level of spending but does not appear to have restrained the rate of increase and was finally withdrawn. Strict price controls for pharmaceutical products have been successful in reducing relative prices by more than a half. However, pricing policies appear to be a weak instrument for containing total expenditures. In part, this may be because pharmaceutical companies have an incentive to respond to falling prices by launching more expensive products at a faster rate. Marketing of new products that offer modest therapeutic gain relative to cost is facilitated by the lack of pharmaco-economic cost-effectiveness criterion in the Greek pricing system. There are also few effective regulations and incentives that promote cost-effective prescribing behavior by physicians. Prescribing patterns have never been properly monitored. To date, only one clinical guideline has been issued for the treatment of hypertension and this does not include any cost-effectiveness considerations regarding the management options. Generic prescribing is not promoted, while prescribing budgets, which have proved effective in changing prescribing behaviour of physicians and achieving cost containment in other countries (Chaix- Couturier et al, 2000), have not received appropriate political commitment from Greek governments. The IKA social insurance fund launched a pilot project in 2003, namely the operation of a Central Processing Unit (CPU) of prescriptions issued by physicians contracted with the fund and pharmacy accounts. Results of the pilot phase were never announced in the public domain. Although the project was not

discontinued, at the moment the Unit is only being used to calculate the aggregated prescribing expenses without exercising any control on volumes and the appropriateness of physicians' prescribing.

The escalation of pharmaceutical expenditures in Greece can be more broadly attributed to the lack of incentives for cost-conscious behavior throughout the health sector including the health insurance funds, hospitals, doctors, pharmacists and patients. In principle, the health insurance funds are responsible for establishing the budgets for primary health care, pharmaceuticals and for hospital services provided to their members. These budgets are calculated mainly on the basis of preceding budgets and do not impose any ceilings, as the expenditures of the social insurance organizations are demand-led and open-ended. Practically, in the absence of regulating and controlling procedures, all expenses are being met. Large deficits of the social insurance funds are periodically and retrospectively covered through subsidies and general taxation, thus providing no incentive to the health insurance funds' administration to economize or to improve efficiency (Tragakis & Polyzos, 1996a).

The role of the pharmaceutical industry in the escalation of costs cannot be neglected. Current legislation only regulates the magnitude of pharmaceutical companies' budgets devoted to promotional activities[7]. However, the actual content of these activities remains beyond control. It is common to find pharmaceutical industry representatives in doctors' clinics updating them on new treatments and relevant pharmaceutical research. Given the lack of control on cost-effective prescribing, it is

[7] The percentage of total sales invested in promotional activities is adjusted on a sliding scale and is set at a maximum of 16% for a turnover less than €6 million up to 4% for a turnover greater than €45 million.

possible, although as yet unconfirmed in the Greek setting, that this encourages the prescription of new medicines with modest therapeutic gain over alternatives. Windmeijer et al. (2006) investigated the response of Dutch general practitioners to companies' promotional activities and found a 1% increase in promotional expenditure raises pharmaceutical consumption by 0.2%.

This study suggests that prescribing patterns of doctors, primarily the increasing tendency to prescribe expensive labeled products rather than generic substitutes, are significant cost drivers. Due to lack of appropriate monitoring mechanisms, it is not known whether the quality of pharmacologic treatment is increasing in proportion to the increasing expenditures. To containing pharmaceutical expenditures and improve their cost-effectiveness in Greece, as elsewhere, there is a desperate need for an integrated information system that will provide data necessary for the systematic monitoring of prescribing patterns. Even more important is the introduction of incentives that will create a demand for such information. From insurance funds down, actors in the health care system must be made conscious the cost consequences of their actions in order that the impact of expenditures on health is raised.

CHAPTER 3: Why Does the Utilization of Pharmaceuticals Vary So Much Across Europe? Evidence from Micro Data on Older Europeans

3.1 Introduction

Throughout Europe, spending on prescription medicines is a strong contributor to rising expenditures on health care, being the most rapidly growing component of total health expenditures (OECD Health Data, 2008). Besides this upward trend in pharmaceutical expenditures, there is also remarkable cross-country variation in the levels of spending. France and Italy spend more than twice as much per capita on medicines than Denmark, and around three-fifths more than the Netherlands (Figure 3-I). Pharmaceutical expenditures consume almost two percent of GDP in France, but less than one percent in Denmark (*ibid*). These differences do not simply reflect variation in levels of spending on health care in general. Pharmaceuticals account for almost 17% of total health expenditure in France, but less than 9% in Denmark (*ibid*). Nor are the spending differences simply attributable to variation in pharmaceutical prices. Denmark is among the most expensive countries in Europe, with price levels 20% higher than the EU-25 average, while in France prices are 10% lower than the average (Konijn, 2007). Differences in spending reflect cross-country variation in the utilization of medicines. The objective of this paper is to explain that variation.

Identification of the reasons for wide disparities in the utilization of pharmaceuticals is valuable at a time when policy makers are struggling to contain health care costs, while maintaining a commitment to universal and equitable access to medicines and other health services. At a very general level, there are three potential sources of the

cross-country disparities. First, differences in demand will arise from variation in the demographic composition and health status of populations. While European populations are relatively homogenous, they do differ in the concentration of the elderly; with Italy, for example, being substantially more "grey" than Denmark or the Netherlands (EUROSTAT, 2008). Second, differences across Europe in policies relating to insurance coverage, cost-sharing, generic substitution, reference pricing, and prescribing guidelines and incentives, as well as in the organization and financing of health care more generally, potentially result in cross-country variation in access to and the cost of medication. The balance of policies adopted in any one country may influence the extent to which there is adequate and equitable access to medication, appropriate adherence to prescribed treatments and cost-effective adoption of new medicines. Third, besides objective differences in the need for medication and in the organization and financing of their supply, pharmaceutical utilization may vary due to cultural differences in the inclination on the part of doctors to prescribe medicines and on the part of patients to use them. It has even been suggested that variation in the utilization of medicines is symptomatic of European differences in the existence of social capital, in the form of willingness to trust (The Economist, 2009). Put rather crudely, while a Dutchman is prepared to believe his doctor's advice that he will get better soon, his Belgian neighbor wants the reassurance of a prescription to be satisfied that his needs have been taken seriously.

The purpose of this chapter is to identify the relative contribution of population, organizational and cultural factors in explaining cross-country variation in the utilization of prescribed pharmaceuticals in Europe. This will help gauge the extent to which differences in pharmaceutical expenditures are the result of policy choices, rather than in health needs, or less amenable cultural factors. This is done using data

from the first wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) collected in 2004, which covers populations aged 50+ in eleven European countries - Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden and Switzerland. By using samples aged above 50, not only do we focus on the highest users of pharmaceuticals but we partially control for variation in demographic composition and this is completed using the age and sex information in the data. A major advantage of these data is that they provide detailed information on health and on receipt of medication specific to diseases and risk factors for which effective drug regimes are established. This makes it possible to assess the extent to which older Europeans with the same needs for medication are treated differently and to relate these differences to incentives operating on the demand and supply sides of pharmaceutical markets. Differences in the organization of health care systems and in policies that are directly or indirectly related to drug utilization are documented and used to explain cross-country variation in rates of utilization among individuals suffering from the same diseases or risk factors. The variation that remains after controlling for need and organizational factors provides an upper bound on the contribution of cultural differences in the propensity to prescribe and use medicines.

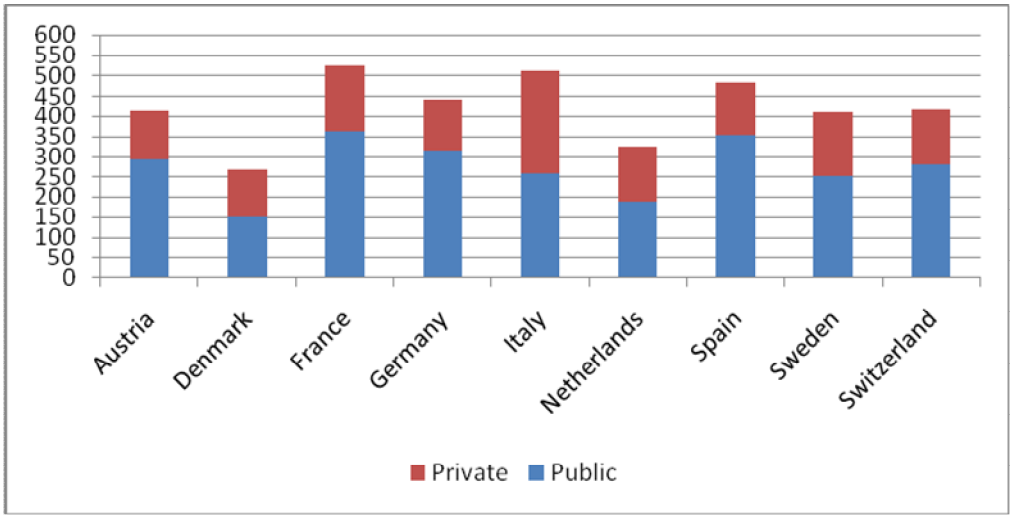
Although there have been numerous studies of pharmaceutical use and expenditures (Thiebaud, Patel, & Nichol, 2008;Clemente, Marcuello, & Montanes, 2008; Noyce et al., 2000), there are very few cross-national comparisons of pharmaceutical consumption. All previous non-clinical studies that investigated cross-country differences in pharmaceutical consumption have relied on aggregate data on pharmaceutical sales or expenditures per capita, with overall, or disease-specific, mortality being used as a proxy measure of the disease burden (Dickson & Jacobzone,

2003; IMS, 2008). But mortality is only a very crude indicator of health care, in particular pharmaceutical, need. Aggregate comparisons cannot inform of the extent to which cross-country differences translate into individuals with homogenous conditions receiving differential drug therapies.

By using micro data, we are able to examine cross-country variation in pharmaceutical utilization after making detailed controls for need, such that the remaining variation can be largely attributed to organizational and cultural factors. By supplementing the micro data with indicators of the regulation and supply of pharmaceuticals, we are able to further identify variance that is explained by policy amenable determinants. The measured organizational characteristics include proxies for: i) the availability of pharmaceuticals in the form of the density of physicians and of pharmacies, and restrictions on the retailing of pharmaceuticals ii) incentives to control prescribing behavior, e.g. prescribing budgets; and, iii) demand as determined by price, cost-sharing and protection of the chronically-ill from co-payments. The variance decomposition method follows that adopted by Bolin et al (Bolin, Lindgren, Lindgren, & Lundborg, 2009) to explain cross-country differences in physician visits. To our knowledge, no previous analysis of this nature has been conducted in relation to pharmaceutical utilization.

The remainder of the chapter is organized as follows: Section 3.2 provides detailed background information on the European pharmaceutical sector, particularly as it pertains to the availability and coverage of medication treatment of the chronically ill elderly. Section 3.3 explains the variance decomposition method and the data are described in section 3.4. The results are presented in section 3.5. The final section summarizes the main results, and discusses potential limitations and the most important policy implications.

Figure 3-I: Total Pharmaceutical Expenditures per Capita (US$, PPP), 2004



Source: OECD-Health Data -2007. The data for the Netherlands are the latest available for 2002; Belgium and Greece excluded due to non-available data.

3.2 Pharmaceutical Policies across Europe

European differences in the organization of health care are perhaps most evident in the regulation of the pharmaceutical market. Although most European citizens have insurance cover, at least to some degree, for prescribed medication, the reimbursement policies, distribution policies, prescribing and dispensing of pharmaceuticals differ to a great extent.

3.2.1 Regulation of Pharmaceutical Distribution and Retailing

The pharmacy profession is organized on a licensing basis in all EU member states. On top of this, some countries have additional barriers to entry, justified by protection of patient safety and preventing oversupply in urban areas while guaranteeing availability in rural ones. In most of the EU countries covered by the SHARE data, ownership and establishment of pharmacies is restricted to qualified pharmacists. In the most heavily regulated countries (France, Italy, Greece, Spain), a pharmacist cannot own more than one pharmacy, chaining of pharmacies is forbidden and pharmacies hold a monopoly over the distribution of Prescription Only Medicines

(POMs) and Over The Counter (OTC) medicines. In less regulated countries (Germany, Switzerland, the Netherlands, but also Denmark), some non-prescription medicines are sold in drug-stores and supermarkets. Sweden is an exception where all pharmaceutical products are sold via a state-monopoly. At the other extreme, pharmacy ownership is not restricted in Belgium and the Netherlands.

Diversification on the degree of regulation is more pronounced regarding the number of pharmacies and the location of new pharmacies. In less regulated countries like the Netherlands, Germany and Switzerland, and to a lesser degree in Denmark, there are no geographical or population criteria for the establishment of new pharmacies. In other countries, the number of pharmacies is restricted relative to population and locality criteria. The permitted minimum distance between pharmacies varies from 200 meters in Italy to 1,000 in some autonomous communities in Spain (e.g. Cannarias, Baleares). A high density of pharmacies might be expected to have a positive 'availability effect' on consumption (Birch, 1988); (Madden et al., 2005).

Direct-to-Consumer Advertising (DCTA) of PMOs is prohibited in all EU countries. Advertising of OTC medicines is, on the other hand, permitted in all countries, with the singular exception of Greece.

Table 3.1 summarizes the most important features of the regulation of the distribution and retailing of pharmaceuticals. To facilitate easier cross-country comparison of the degree of regulation, we have created a summary index of regulation. Each dimension of regulation is scored on a scale from 1 to 4, with 1 indicating a liberal setting and 4 a highly regulated one. To give an overall impression of the degree of regulation, we simply sum the scores. Of course, this index is subjective and rather crude, but it is nonetheless useful in distinguishing between highly regulated and liberal regimes. In

addition to the state monopoly operating in Sweden, heavily regulated systems are found in the more southerly European countries (Greece, Italy, Spain and France) and in Austria. Systems with a middle degree of regulation are in Belgium, Denmark and Germany, while the most liberal regimes are in the Netherlands and Switzerland. In the empirical analysis, we group these latter two sets of countries and distinguish between them and the six highly regulated countries.

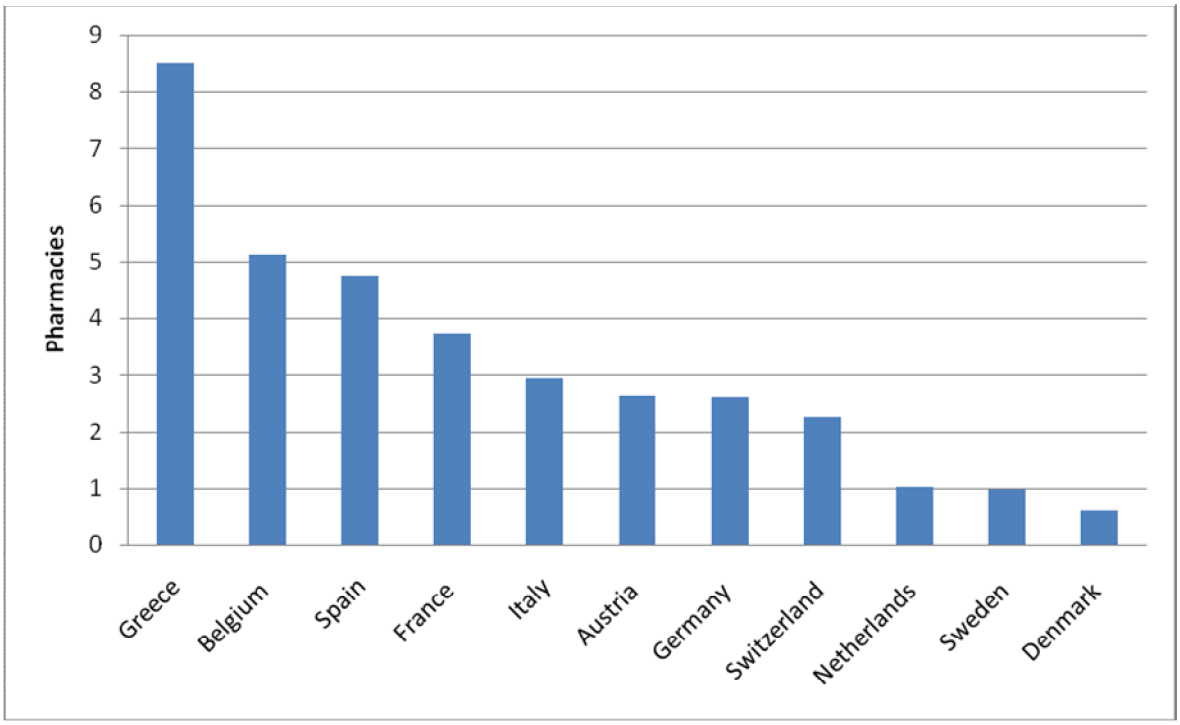
The number of pharmacies per 10.000 inhabitants ranges from 0.6 in Denmark to 8.5 in Greece (**Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.**). Comparing **Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.** with Table 3.1, it is apparent that, perhaps rather paradoxically, the countries with the most detailed entry restrictions generally also have the greatest supply in pharmacies. At first sight, this appears inconsistent with the standard model of regulatory capture in which entry barriers are used to limit supply, raise price and extract rent. But one must bear in mind that, besides entry, mark-ups are also regulated. Liberalizing entry restrictions in combination with lowering regulated markups need not lead to reduced geographic coverage of pharmacies and may result in significant benefits to consumers (Schaumans & Verboven, 2006).

Table 3.1: Regulation of Pharmaceutical Retailing in SHARE countries

Restrictions on:	Austria	Belgium	Denmark	France	Germany	Greece	Italy	Netherlands	Spain	Sweden	Switzerland
Ownership	4	1	3	4	3	4	4	1	3	4	2
Location	4	3	1	4	1	4	4	1	4	4	1
Diversification	4	1	3	4	1	4	4	1	4	4	1
Pharmacies Monopoly on Dispensing	4	4	2	3	2	4	4	2	4	3	1
Advertising	2	3	2	2	2	4	2	2	2	2	2
Total	18	12	11	17	9	20	18	7	17	17	7
Classification used in analysis	Restricted	Liberal	Liberal	Restricted	Liberal	Restricted	Restricted	Liberal	Restricted	Restricted	Liberal

Note: Subjective scores on a 1-4 scale with a higher score indicating a higher degree of regulation. Subjective classification of regulatory regime as "restricted" or "liberal" based on clustering of the total **score**. **Ownership restrictions:** degree to which only pharmacists are entitled to own a pharmacy.
Location requirements: geographic and population restrictions on the establishment of new pharmacies.
Restrictions of Diversification: limitations to the number of pharmacies owned and formation of pharmacy chains.
Pharmacies monopoly on dispensing: degree to which pharmacies have a monopoly over dispensing of medicinal products or whether dispensing of particular products is allowed at doctors and/or other retail shops.
Advertising Restrictions: degree to which advertising is prohibited for all medicinal products or permitted for some products, e.g.. OTCs.

Figure 3-II: Number of Pharmacies per 10,000 Inhabitants in Europe (SHARE Countries)



3.2.2 INCENTIVES TO CONTROL PRESCRIBING BEHAVIOR

Health professionals, through prescribing behavior, and pharmacists, through the dispensing of pharmaceuticals, both exercise a potentially important influence on pharmaceutical utilization and expenditures. Regulation of prescribing and dispensing behavior is summarized in Table 3.2. The most direct measure acting on physicians is the restriction of prescription drugs that are entitled to reimbursement by the use of positive and/or negative lists. This measure applies in all countries, with the positive list being most popular[8]. A negative list is used in Germany, while in Spain a negative list is being used in conjunction with a positive list. The second measure is the issuing of guidelines and treatment protocols, aiming to encourage rational, appropriate and economic prescribing. The measure is widely used in all countries, with the exception of Greece and Switzerland. However, the success of prescribing guidelines in promoting rational and cost-effective prescribing is dependent upon effective

[8] A positive list was in operation in Greece at the time the wave 1 SHARE data were collected but was abolished in 2006.

dissemination and the mechanisms employed to ensure compliance with recommendations (Coleman & Nicholl, 2001); (Watkins et al., 2003). In most countries, guidelines have no mandatory character and are not used in combination with incentives for adhering to them. However, in Germany, Austria, and, to a lesser degree, in Switzerland, Belgium, Denmark and the Netherlands, physicians' prescribing is monitored, and in some cases physicians receive feed-back on their prescribing patterns.

There is evidence that prescribing and practice budgets are effective in cutting drug expenditure, not only per item and per patient, but also through volumes (Sturm et al., 2007). Prescribing budgets and further pecuniary incentives have only been introduced in Germany, Italy and Spain, while since 2006 (post the 2004 data analyzed here) physicians in Belgium are obliged to prescribe a certain percentage of "cheaper medicines", which varies depending on the specialty. In Sweden, although there are no sanctions against doctors for not following prescribing guidelines, certain counties have established incentive agreements, where adherence of doctors to decentralized budgets and prescription targets results in reward. In the empirical analysis, we control for financial incentives operating on prescribing behavior by distinguishing between the countries that have implemented prescribing budgets and those that have not.

Table 3.2: Number of Pharmacies per 10,000 Inhabitants in Europe (SHARE countries)

Policy	Austria	Belgium	Denmark	France	Germany	Greece	Italy	Netherlands	Spain	Sweden	Switzerland
Prescribing Guidelines	√	√	√	√	√	X	√	√	√	√	X
Monitoring/ Individual audit on Prescribing	√	√	√	X	√	X	√	√	√	X	X
List	√	√	√	√	√	√	√	√	√	√	√
Prescribing Budgets/ Financial Incentives	X	X	X	X	√	X	√	X	√	√	X
Generic Prescribing	X	X	X	√	√	X	√	√	√	X	√
Generic Substitution	X	X	√	√	√	X	√	√	√	√	√

Prescribing Guidelines: evidence based guidelines issued by statutory bodies to promote an appropriate and economic prescribing of pharmaceuticals.
Monitoring and Individual Audit: of Prescribing: monitoring of doctors' prescribing habits (volumes/ costs/ quality) and physicians receiving personal feedback on their prescribing practices
List: refers to either positive or negative lists that guarantee or limit that include pharmaceutical for which reimbursement is guaranteed or limited.
Prescribing Budgets: budgets allocated to physicians or health authorities or areas to cover their prescribing over a given period
Financial Incentives: payments or fines for adherence or non-adherence to treatment guidelines or achieving targets that relate more to quality rather than financial targets only.
Generic Prescribing: allowing doctors to prescribe using non-proprietary name for a pharmaceutical preparation
Generic Substitution: allowing pharmacists to substitute the product written on the prescription by a generic equivalent.

3.2.3 Cost-sharing and Reimbursement Policies

Cost-sharing, particularly for pharmaceuticals, is increasingly being adopted in European health systems. Since co-payments are regressive (Wagstaff et al., 1999); (Wagstaff & van Doorslaer, 1992), many countries implement them in conjunction with mechanisms to protect vulnerable groups. Of particular relevance to this study are exemptions granted to the elderly and individuals suffering from chronic conditions. These groups, in addition to low income individuals, have been found to be particularly sensitive to drug charges. Lexchin and Grootendorst (2004), reviewing studies from the US and Canada, conclude that cost-sharing results in considerable decreases in use of drugs (both essential and discretionary) by the poor and chronically ill. Drug price elasticities among these groups were found to range from -0.34 to -0.50. Klick and Stratmann (2006) found that a one percentage point increase in the coinsurance rate implies a 1.01 percent decrease in the number of prescriptions filled and a 0.69 percent decrease in total drug expenditures of US pensioners, indicating that the elderly population is quite responsive to prescription drug price changes. The same broad conclusion was reached by Shang and Goldman (Shang & Goldman, 2007) and in studies that concentrated on chronically-ill populations (Cole, Norman, Weatherby, & Walker, 2006; Gibson et al., 2006; Goldman, Joyce, & Karaca-Mandic, 2006; Lichtenberg & Sun, 2007). Lichtenberg & Sun (2007) estimated that the Medicare Part D reform, which extended prescription drug benefits to 43 million US pensioners, reduced user cost by 18.4% and increased utilization by 12.8% in 2006.

Western European studies (Hughes & McGuire, 1995)) also suggest that prescription cost-sharing reduces utilization, but there is some variation in estimates of price-elasticity. From a meta-analysis Gemmill et al. (2007) found estimates to vary

significantly by the institutional setting, the extent of public financing, the aggregation of the data and the research methodologies employed and estimated a corrected elasticity of -0.209 with a standard error of 0.026. Elasticities were found to be lower in tax-based health insurance systems, which is to be expected given lower co-payments in such systems.

Table 3.3 summarizes pricing and reimbursement policies in the SHARE countries and differences in cost-sharing protection mechanisms. Only in Austria, Italy and the Netherlands are all pharmaceuticals 100% reimbursable. Co-payment rates not only vary between countries, but also within countries, depending most commonly on the category of the drug. Sweden, Denmark and Switzerland follow a consumption-based reimbursement, where the level of reimbursement depends on the patient's (annual) expenditure on pharmaceuticals, with the patient paying the full cost up to a threshold. In Switzerland, a general flat co-payment rate is applied after a deductible, while in Denmark and Sweden the co-payment rate decreases gradually, reaching 0% and 15% respectively.

In all countries under study, cost-sharing is implemented in conjunction with mechanisms to protect vulnerable groups of the population (the chronically ill, low income and pensions, and the elderly), such as reduced co-payment rates or out-of-pocket maximums. Generous protection mechanisms related to age are found in Spain, where pensioners are totally exempt from co-payments. Low-income groups and especially low-income pensioners are totally exempt from cost-sharing in France, Austria and Italy. In Greece, only low-income pensioners are entitled to a higher reimbursement rate, while in Belgium and Denmark[9] this is granted also to non-pensioners on low incomes.

Of particular relevance to the current study are the disease-specific protection mechanisms. The most generous disease-specific protection mechanisms can be found in Spain, France but also in Greece, where people suffering from specific chronic or

[9] In Denmark pensioners expenditures may be covered up to 85% of the pensioner's out-of-pocket payments for reimbursable pharmaceuticals, depending on the pensioner's income and personal wealth. However such applications are evaluated and supplementary reimbursement is granted on a individual basis.

life-threatening diseases are totally exempt from cost-sharing (or are subject to reduced co-payment rate for some specific diseases in Greece). A reduced maximum annual out-of-pocket amount applies for chronically-ill in Germany, while preferential reimbursements are only offered to disabled people in Belgium and to the chronically-ill on a personal basis in Denmark.

Table 3.3: Pricing, Reimbursement and Patients' Cost-Sharing in SHARE countries

	Pricing	Reimbursement	Co-Payments	Protection Mechanisms
Austria	price-contracting with price/volume agreements rebate on excess sales	No reference price system. All pharmaceuticals in the positive list are fully reimbursed. Pharmaceuticals not on the positive list are not reimbursed.	For reimbursable pharmaceuticals patients pay a fixed prescription fee amounting to € 4.60 (in 2006).	Exemption from prescription fee for low-income pensioners, patients with communicable diseases, (exemptions are valid for the whole family
Belgium	a) price comparisons with weights to R&D b) Price cuts/freezes for older drugs c) reference pricing for products with generic equivalents	Products on the positive list partly or fully reimbursed Products with generic equivalents are reimbursed at the generic price	co-insurance (25%-80%) up to max. amount (depending on family's net income) For serious/ chronic illness: 0%.	"preferential reimbursement" of 15% for widows, pensioners, disabled. Annual threshold for vulnerable groups & maximum copayment per prescription from €6.70 to €26.10 for certain reimbursement categories.
Denmark	Price agreement between the industry and the Ministry of Health	Reference pricing for reimbursement. Consumption-based reimbursement, i.e. the rate depends on patient's annual pharmaceutical expenditure for reimbursable medicines.	Depending on annual pharmaceutical expenditure copayment rate varies from 100% to 15%.	Exemptions for chronically-ill above an annual ceiling (3805 DKr). Total exemption for terminally ill.
France	Free pricing for non-reimbursable products. Price fixing (negotiation with manufacturers); ccomparisons with EU countries, recurrent price freezes/cuts for innovative products	Only drugs in the positive list are eligible for reimbursement. Four reimbursement rates: 100% (for highly effective drugs; 65%, 35% & 15% and 0% for drugs with limited therapeutic value	Fixed co-payment of €0.53 per pack plus a co-payment (difference between the retail price and the rate of reimbursement)	Total exemption: a list of 30 chronic/ costly diseases[1], conditions with >6 month duration. People with low incomes, disability/ work injury benefit.
Germany	Free pricing of stand-alone drugs	Reference prices for therapeutic substitutes and generics. All pharmaceuticals in the positive list are fully reimbursed. Lifestyle and OTC drugs are not reimbursed.	Cost-payment of 10%, with a min. of 5€ and a max. of 10€[10] Price differential between the reference and the market price.	Total exemptions for children <12years, children >12yrs with developmental/severe diseases. Annual total cost-sharing limited to 2% of annual gross income (1% for chronically ill)
Greece	Price Fixing for imported drugs (average of the 3 lowest prices of the EU-25) Basic cost formula for locally produced products	All medicines with approved price are eligible for reimbursement- standard rate 75%. OTC; 'life-style' products are not reimbursed	25% general co-payment rate	Low income pensioners; chronic/sever diseased reduced (10%) co-payment rate. Specific chronic/severe conditions totally exempt

[10] Pharmaceuticals priced 30% below the reference price are exempt from co-payments, which is the case for more than 12,000 medicines (Busse, 2008)

	Pricing	Reimbursement	Co-Payments	Protection Mechanisms
Italy	- Average European Price (AEP) for old products - Contractual model (negotiation) for new products Price cuts/ freezes	All pharmaceuticals in the positive list are fully reimbursed.	Prescription fee (€ 1 or 2) applied only in few Regions	Exemptions to chronically ill, people with rare diseases, disabled. For some regions use exemptions based on income and/or age.
Netherlands	For POM price fixing biannually (average price of comparable products in: Germany, France, Belgium, UK.	Reference pricing for interchangeable therapeutically products. All pharmaceuticals in the positive list are fully reimbursed.	No co-payment policy. (patient pays the full difference between medicine price and the reimbursement limit	Fiscal compensation arrangements for low income groups.
Spain	Price negotiations on cost-plus basis; EU price comparisons Price-Volume agreements for costly products	Reimbursement is based on the agreed price (reference pricing) Positive & Negative List	Based on the price of the drug. Generally 40% of the price, 30% for civil servants mutual companies.	Pensioners, handicapped and chronically ill are fully exempted from pharmaceutical co-payments
Sweden	Price control for reimbursable products (cost-effectiveness criteria) Free-pricing for non-reimbursable pharmaceuticals	Mandatory generic substitution since2002. Consumption-based reimbursement, i.e. the rate depends on patient's annual pharmaceutical expenditure for reimbursable medicines.	Depending on annual pharmaceutical private expenditures co-payment rates from 100% -10%, up to a max. annual co-payment of €194[11]	Maximum limit of €194 annual. Children <18 years within a family are considered as one beneficiary and their costs are pooled together.
Switzerland	Free-pricing of non-reimbursable products; negotiations with manufacturers for reimbursable products	Only products included in the positive list are being reimbursed	Payable deductible amount and a 10% co-insurance above the deductible. (20% for brand-name drugs with interchangeable generics available)	Cost-sharing is capped annually but there is no exemption for low-income people. Children <18 years exempt from deductibles.

1. Federation of Social Insurance Institutions (HVSV). 2. Economic Committee for Health Care Products (CEPS) 3. http://www.ameli.fr/229/DOC/2259/fiche.html?page=4.
4. Pharmaceutical Benefits Board (Läkemedelsförmånsnämnden, LFN)

[11] In Sweden cost-sharing due to refusal of generic substitution, payments for not reimbursed medicines and OTC drugs are not included when calculating the 12-month co-payment ceiling of SEK 1,800/ €193.91

3.2.4 Indicators of Organizational Determinants

In Table 3.4 presents the summary indicators used in the empirical analysis to represent organizational factors potentially relevant to explaining cross-European variation in the utilization of pharmaceuticals. To capture any availability effect, we rely on the densities of pharmacists and physicians relative to the population. Further, we distinguish between the countries in which the retailing of pharmaceuticals is highly regulated (Austria, France, Greece, Italy, Spain, and Sweden) and others adopting a more liberal regime (Belgium, Denmark, Germany Netherlands and Switzerland), where the separation is based on the policies summarized in Table 3.1. This allows us to test whether restrictions on who can sell prescription drugs appears to have any impact on the level of utilization.

With respect to policies acting on prescribing behavior, we distinguish the four countries (Germany, Italy, Spain, and Sweden) where doctors have prescribing budgets or other financial incentives to constrain prescribing. As noted above, there is evidence to support the effectiveness of such policies.

I control for the impact of cost-sharing on utilization using estimates from the European Federation of Pharmaceutical Industries and Associations (2007) of the average cost paid by a patient as a percentage of the total cost paid by the insurer and the patient (EFPIA, 2007; Office of Fair Trading, 2007).[12] Cost-sharing is by far the highest in Denmark, where, on average, patients pay 40% of the cost of the reimbursed pharmaceuticals. In all other countries, cost-sharing is less than half of that rate. In Greece, Belgium, Austria and Sweden, the rate varies from 14-22%. In Switzerland, patients pay around 10%, and in Germany and Spain about 7%. In Italy,

[12] For France, the cost paid by the insurer includes that covered by supplementary insurance (mutual or private).

France and the Netherlands there is near full insurance of the cost of prescribed pharmaceuticals. Obviously, the price effect depends not only on the proportion of the cost for which the patient is liable but also on the level of the cost. To control for the latter, we use the average retail (gross of reimbursement) price of pharmaceuticals, expressed as a percentage of the EU-25 average (Konijn, 2007).[13] Prices are highest in Switzerland, Germany, Denmark and Italy and lowest in Greece, Spain and France. A dummy indicates one for reduced cost-sharing for individuals reporting chronic conditions in Denmark, France, Germany, Greece, Italy and Spain.[14]

[13] Retail prices of pharmaceuticals are based from the Price Level Index for pharmaceuticals produced by the Eurostat-OECD Purchasing Power Parity (PPP) programme.

[14] We experimented with a dummy for those on low income in countries granting exemptions to this group but it was always correlated with lower utilization. It is likely that this reflected an income effect, rather than the intended price effect and so we decided to omit the dummy. Income is controlled for.

Table 3.4: Description and Means for Indicators of Organizational Determinants of Pharmaceutical Utilization Used in Empirical Analysis

Variable	Description	Austria	Belgium	Denmark	France	Germany	Greece	Italy	Netherlands	Spain	Sweden	Switzerland
Quantity and regulation of suppliers												
Pharmacy density	Pharmacies per 10.000 persons	2.62	5.13	0.60	3.74	2.59	8.50	2.94	1.02	4.76	0.98	2.25
Physician density	Physician per 1.000	3.5	4.0	3.2	3.4	3.4	4.9	4.2	3.6	3.4	3.4	3.8
Retail restrictions	High degree of regulation of pharmaceutical retailing	1	0	0	1	0	1	1	0	1	1	0
Financial incentives on suppliers												
Incentives	Physicians have financial incentives to constrain prescribing	0	0	0	0	1	0	1	0	1	1	0
Price effects and cost-sharing												
Retail price	Price level index for pharmaceuticals (EU25=100)	106	105	120	91	127	73	117	109	77	94	185
Patient cost	Average cost paid by the patient as % of the total reimbursed pharmacy market value at retail prices	17%	15.90%	40.40%	1.00%	7.10%	13.60%	3.20%	0.50%	7.00%	22.40%	10.00%
Chronic exempt	Chronically-ill exempt from/pay reduced co-payments (mean)	0	0	0.64	0.62	0.56	0.54	0.68	0	0.57	0	0

Retail restrictions: 1 if the country is highly regulated ("restricted") in pharmaceutical retailing according to the classification presented in Table 1.
Incentives: 1 if the country operates prescribing budgets allocated to physicians/ health authorities or makes payments/fines for (non-)adherence to treatment guidelines that relate to quality of prescribing.
Retail price: gross of patient reimbursement price relative to the EU-25 average for the year 2005. Source: Eurostat-OECD Purchasing Power Parity Programme (Konijn, 2007).
Patient cost-sharing: average cost paid by the patient as a percentage of the total cost paid by the insurer and patient in the total reimbursed pharmacy market (OTC products are not included if they are not reimbursed). For France the costs paid by the insurer includes that covered by supplementary insurance (mutual or private). Source: European Federation of Pharmaceutical Industries and Associations (EFPIA, 2007)).
Payment exemption: 1 if the individual reports one of the diagnosed conditions identifiable in SHARE (see Table V) that is exempt from co-payments, or is subject to reduced co-payments, in his country and meets any other criteria for illness-related exemptions as summarised in section 2.3. Figures in the row give the means of this dummy variable and are zero in countries offering no such exemptions / payment reductions. In Greece, the dummy is 1 for all diagnosed conditions reported in SHARE except for hypertension. In Spain, the exemption dummy is turned on for all conditions except arthritis. For France, exemptions were assumed to apply for all conditions but for asthma and high blood cholesterol, for which, consistent with regulations, the exemption dummy was turned on only for those reporting they had been diagnosed at least 6 months previously. For Italy, it is assumed that all reported SHARE conditions are exempt. For Germany, the dummy is switched on for individuals reporting any of the SHARE conditions provided they also report at least four doctor visits (GPs or specialists) during the last year. For Denmark, due to lack of more detailed data, we assumed that everyone who had been diagnosed with one of the chronic conditions for more than a year was entitled to preferential reimbursement for the chronically ill.

3.3 Measurement and Explanation of Cross-Country Variation

The aim is to measure and explain variation across Europe in the utilization of prescribed medicines, paying particular attention to the extent to which cross-country variation is attributable to differences in populations, policies or cultures. For this purpose, we adopt the method proposed by Bolin et al. (2009), which, using micro data, measures the total variation in utilization of GP visits across countries and then identifies the proportion of this that remains unexplained after sequentially controlling for individual level determinants, in the form of health and socio-demographics, and country level determinants given by the policy variables identified in the previous section. The variation remaining after controlling for these determinants may be attributable to omitted individual level need/enabling factors and/or unmeasured policy differences, but also provides an upper bound on the variation that is attributable to cultural differences in attitudes to the prescription and use of medicines.

We adopt a disease-based approach to the analysis of variation in utilization as suggested by the OECD and others (Dickson & Jacobzone, 2003); (Goldman & Smith, 2005); (Maurer, 2008). This is feasible because SHARE asks about use of medication in direct relation to reported, diagnosed medical conditions. Hence, we can analyze the probability of receiving medication for a medical condition for which an effective drug therapy is known to exist. This provides much more precise evidence than is typically the case in studies of health care access. We are investigating variation in health care treatments that can be anticipated to have an impact on health outcomes. As individuals diagnosed with the same condition may

still differ in their need for drug treatment the analysis controls for further predisposing characteristics such as age, gender and indicators of health status. Further, at the individual level we control for enabling, or non-need, factors, such as income, occupation and education that may affect access to health care and ability to manage health conditions (Andersen, 1995;Andersen, 1968;Ryan & Birch, 1991; Wagstaff & van Doorslaer, 2000)

Individuals are first asked whether or not they have ever been diagnosed to have each condition on a list including asthma, arthritis, diabetes, etc. Subsequently, all individuals are asked if they are currently taking prescribed medication for each condition on the list. We restrict attention to conditions for which medication is known to have therapeutic value. We first examine variation in the utilization of medication for these conditions irrespective of whether a diagnosis is actually reported. Then we examine variation in utilization conditional on a reported diagnosis. Since the probabilities of reporting a diagnosis and medication are likely to be related through unobservables, we model both events simultaneously using the bivariate probit model, which is feasible given that individuals reporting no diagnosis may, nonetheless, report receipt of medication. Let y_{ij1} be a dummy variable equal to 1 if individual *i* residing in country *j* reports one of the diagnoses we restrict attention to and let y_{ij2} be a dummy that indicates whether medication is received for any of those conditions. The values of these dummy variables are presumed to be determined as follows,

$$y_{ijk} = 1\left(y^*_{ijk} = H_{ijk}\gamma_k + S_{ijk}\theta_k + Z_{jk}\delta_k + \varepsilon_{ijk} = X_{ijk}\beta_k + \varepsilon_{ijk} > 0\right) \qquad (1)$$

where k=1,2, 1() is the indicator function, H_{ijk} includes indicators of need (health and demographics), S_{ijk} represents a vector of socioeconomic enabling factors, Z_{jk}

includes the country level indicators of policy. The error terms (ε_{ijk}) are each assumed to have a conditional mean of zero, are scaled to have unit variance and are assumed to be bivariate normally distributed with covariance indicated by ρ. Define $q_{ijk} = 2y_{ijk} - 1$. Then the contributions to the likelihood are given by

$$P\left(Y_1 = y_{ij1}, Y_2 = y_{ij2} \middle| X_{ij1}, X_{ij2}\right) = \Phi_2\left(q_{ij1}X_{ij1}\beta_1,\ q_{ij2}X_{ij2}\beta_2,\ q_{ij1}q_{ij2}\rho\right) \tag{2}$$

where Φ_2 represents the standard normal bivariate cumulative distribution function (cdf) (see e.g. Cameron & Trivedi, 2005).

The probability of receiving medication unconditional on reporting a diagnosis is simply,

$$E\left[y_{ij2} \middle| X_{ij2}\right] = P\left(y_{ij2} = 1 \middle| X_{ij2}\right) = \Phi\left(X_{ij2}\beta_2\right) \tag{3}$$

where Φ is the standard normal univariate cdf. Among those individuals who do report a diagnosis, the probability of receiving medication is,

$$E\left[y_{ij2} \middle| y_{ij1} = 1,\ X_{ij2}\right] = P\left(y_{ij2} = 1 \middle| y_{ij1} = 1,\ X_{ij}\right) = \frac{\Phi_2\left(X_{ij1}\beta_1, X_{ij2}\beta_2, \rho\right)}{\Phi\left(X_{ij1}\beta_1\right)} \tag{4}$$

Having estimated the model, the average residual utilization within each country is given by,

$$r_j^* = \frac{1}{N_j}\sum_{i=1}^{Nj}\left(y_{ij2} - \hat{y}_{ij2}\right) \tag{5}$$

where N_j is the number of respondents in country j and $\hat{y}_{ij}$ is the predicted probability of drug use given by either (3) or (4) depending upon whether one wants an unconditional or conditional analysis. Following Bolin et al (2009), a measure of the unexplained cross-country variation is given by the mean of the squared deviations in these country-specific residuals:

$$MSD = \frac{1}{J}\sum_{j=1}^{J}(r_j^* - \bar{r})^2 = \frac{1}{J}\sum_{j=1}^{J}[(\bar{y}_{j2} - \bar{y}_2) - (\bar{\hat{y}}_{j2} - \bar{\hat{y}}_2)]^2 \tag{6}$$

where J is the number of countries (J=11), $\bar{r} = \frac{1}{J}\sum_{j=1}^{J} r_j^*$, $\bar{y}_{j2} = \frac{1}{N_j}\sum_{i=1}^{N_j} y_{ij2}$ is the average rate of use in country j, $\bar{y}_2 = \frac{1}{J}\sum_{j=1}^{J} \bar{y}_{j2}$ the (simple) average rate of drug use over all countries, $\bar{\hat{y}}_{j2} = \frac{1}{N_j}\sum_{i=1}^{N_j} \hat{y}_{ij2}$ and $\bar{\hat{y}}_2 = \frac{1}{J}\sum_{j=1}^{J} \bar{\hat{y}}_{j2}$.[15]

Note, when no covariates are included in the probit, the second term in square brackets in equation (3) is zero. The first term is the deviation of a country's drug utilization rate from the simple average of these country-specific rates. Then, the average of the square of this first term is a measure of the total variability across countries in drug utilization rates that is to be explained.

Once regressors are added, the second term in square brackets is non-zero and expresses the deviation of the predicted utilization rate in a country given covariates from the (simple) across country mean of these predictions. This corresponds to the cross-country variability that is explained by the covariates. If the model were able to predict utilization perfectly in each country, then the MSD would be zero. Larger values of the MSD indicate more of the cross-country variability that is left unexplained by covariates.

The probability of utilization is first modeled as function of a constant only (model 0) and a baseline measure of MSD computed. Health and demographic variables are then added to give model 1 and the MSD re-computed. The change in MSD indicates the proportion of cross-country variation that is explained by population differences in need factors. Socioeconomic characteristics are then added

[15] Bolin et al (2009) use the term mean squared error (MSE) for this measure. To avoid confusion with the MSE of the bivariate probit estimator or the sample MSE, we prefer the label mean squared deviation.

(model 2) and the process repeated to identify the proportion of the variance explained by differences in enabling factors. Finally, the country level policy variables are added (model 3) to identify the additional variance that can be explained by organizational differences in the supply and demand of pharmaceuticals between countries. The remaining unexplained cross-country variation is the upper bound on the contribution of cultural factors.

Note that the MSD is not necessarily decreasing as regressors are added to the model. For example, a country could have a greater than average utilization rate, while the model predicts it to have a lower than the average rate. If this happens for a sufficiently large number of countries, then the MSD of model 0 can be smaller than that of a model with covariates. This would indicate that differences in the distribution of covariates cannot explain the observed cross-country difference in utilization rates. In fact, one would anticipate exactly the opposite direction of cross-country differences in utilization from the observed differences in covariates.

3.4 Data

3.4.1 Sample

The Survey of Health, Ageing and Retirement in Europe (SHARE) is a cross-national survey of health and health care, amongst other topics, for representative samples of the 50+ population. We use data from the first wave, collected in 2004, which covers around 28,517 individuals in 11 countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden and Switzerland). Israel is excluded due to incomplete data. SHRE data collection was based on a computer-assisted personal interview (CAPI) and a self-completion paper & pencil questionnaire. Samples are full probability samples, while eligible for participation were all households members aged 50 and over, plus their spouses independent of their age. The survey was conducted using consistent sampling frames and survey design across all participating countries resulting in a high degree of cross-national comparability. SHARE provides a sample of older individuals thus capturing the population with the greatest burden of degenerative diseases and with the highest consumption of pharmaceuticals.

In general, response rates are comparable to those obtained in cross-naitonal surveys conducted by Eurostat and are slightly better than those of other European-wide scientific surveys (De Luca & Peracchi, 2005)[16]. Respone rates are particulary low (<40%) in Belgium and Switzerland but in the latter case this is consistent with the achieved in orhter surveys (ibid). Non-reposene will be a particular problem in the

[16] Response rates are as follows: Austria (55.6%), Belgium (39.7%), Denmark (63.2%), France (79.2%), Germany (60.8%), Greece (63.4%), Italy (52.8%), Netherlands (60.6%), Spain (54.3%), Sweden (47.3%), Switzerland (38.8%). Source: http://www.share-project.org/t3/share/index.php?id=97

present context if it is related to the utilization of pharmaceuticals and this relationshiop varies across countries. Since SHARE samples from the non-institionalized population and rates of institutionalization vary, this could be the case. This makes it even more important to control for differences in the need characteristics of populations, which we do by examining utiliztiaon of medicines that are directl related to diagnosed conditions and by making extensive controls for health. In addition, we apply sample weights to make the sample of each country representantive in terms of age and gender of the respective target population.

3.4.2 Medication Rates for Specific Conditions

The analysis investigates variation in utilization of medication conditional on medical need. Most previous studies of pharmaceutical utilization have relied on either aggregated need proxies, such as mortality rates and age composition (Dickson & Jacobzone, 2003), or subjective indicators of general health and functioning. Besides the potential problem of heterogeneity in the reporting of health (Groot, 2000; Sen, 2002;Juerges, 2007a; Bago d'Uva, van Doorslaer, Lindeboom, & O'Donnell, 2008), these indicators do not provide information on need for specific treatments. A major advantage of SHARE is that it contains "quasi-objective" indicators of health in the form of reported doctor-diagnosed health conditions (Juerges, 2007a; Maurer, 2007), and it asks directly about drug treatment for each of those specific conditions. This allows us to identify much more precisely individuals in need and to examine utilization of drugs specific to meeting that need. In addition, SHARE provides comparable data on a broad range of health indicators (see below), which allow detailed control for severity and co-morbidity beyond the need indicated by presence of a diagnosed condition.

We focus on reported doctor-diagnosed conditions, which warrant some form of medication treatment and for which drug treatment is generally regarded to be advantageous. The conditions are high blood pressure (hypertension), high cholesterol, diabetes, asthma, arthritis, heart attack (including myocardial infarction, coronary thrombosis, and other heart problems such as congestive heart failure) and stroke or cerebrovascular disease.

Pharmacological therapy for hypertension is strongly recommended and includes calcium-channel blockers, diuretics, angiotensin-converting enzyme (ACE) inhibitor and angiotensin-II receptor antagonist. More than one drug is often required to achieve blood pressure control (NICE CG No.34, 2006). Treatment of high blood cholesterol, which is an important contributor to cardiovascular disease, depends on various factors, including individual risk factors, age, general health and side effects. Common drug therapies include statins, cholesterol absorption inhibitors and bile-acid-binding resins (NICE TA No.94, 2006). Antihyperglycemic drugs or insulin replacement therapy is important for the control of both Type 1 and Type 2 diabetes[17]. Medication, such as bronchodilators and corticosteroids, is often indicated to control symptoms and prevent exacerbations of asthma (Scottish Intercollegiate Guidelines Network (SIGN), 2008). Drug therapy for arthritis involves combinations of non-steroidal anti-inflammatory drugs (NSAIDS), slow-acting drugs, corticosteroids or disease-modifying antirheumatic drugs (DMARDs) (NICE TA No.27, 2001; Kennedy et al., 2005). Depending on the aetiology and risk factors of heart attack and stroke, common medical modules include drugs for controlling high blood pressure, hypercholesterolemia and hyperlipidemia, antithrombotics and anticoagulants but also

[17] On top of medical treatment, patient education and support, sensible exercise, self glucose monitoring play an important role in maintaining blood glucose levels within acceptable bounds.

pharmaceutical treatment for further cardiac diseases (Smith, Allen, Blair, & et al., 2006; Sacco, Adams, Albers, & et al., 2006).

SHARE identifies whether the individual reports currently taking drugs, at least once a week, for each of the above mentioned conditions, however it does not contain information regarding quantities of drugs consumed. Table 3.5 presents pooled and country specific rates for the prevalence of conditions and medication received by those reporting a condition. Figures in bold indicate statistically significant differences in proportions relative to the country with the highest rate, which itself appears in italics.

Around 61% of the respondents across all countries report suffering from at least one doctor-diagnosed health condition, with prevalence varying from 46% in Switzerland to 66% in Belgium. Of those declaring a diagnosed condition, 83% report using medication for at least one of their conditions. There is considerable variation in the rate of medication across countries, varying from 75% in Denmark to 87% in France. Note that these countries correspond to those with the lowest and highest spending on pharmaceuticals identified in Figure 3-I, suggesting that our analysis of utilization may be directly relevant to explaining such differences in expenditures.

Table 3.5: Disease Prevalence and Pharmaceutical Utilization Rates (%)

	Pooled	Austria	Belgium	Denmark	France	Germany	Greece	Italy	Netherlands	Spain	Sweden	Switzerland
Any Condition	61.3	53.85	66.26	58.80	64.6	59.03	62.07	65.53	49.92	64.06	54.84	46.04
Drug Use if have any condition	83.2	84.32	**80.62**	**75.12**	*86.48*	85.93	86.17	**79.53**	79.28	**82.06**	**79.72**	83.47
Hypertension Diagnosed	33.2	30.75	31.53	29.14	28.90	36.06	36.20	37.09	25.47	32.79	28.55	26.30
Drug Use if hypertensive	86.3	**89.97**	**66.65**	**82.71**	*93.46*	**89.93**	**90.76**	**88.36**	**81.93**	**84.85**	**87.75**	92.93
Cholesterol Diagnosed	20	15.91	28.88	15.26	23.02	18.35	21.07	19.61	14.75	23.94	16.25	12.89
Drug Use if have high blood cholesterol	61.9	**56.05**	**57.09**	**62.09**	*80.12*	**55.94**	**61.83**	**54.41**	**67.47**	**58.76**	**59.05**	**63.39**
Diabetes Diagnosed	11.1	8.31	8.39	7.44	9.60	12.01	9.28	12.00	8.51	14.56	8.94	5.49
Drug Use if diabetic	80.9	*85.64*	81.56	**69.63**	81.17	83.49	79.96	81.34	82.47	**77.85**	**68.85**	77.69
Asthma Diagnosed	4.5	4.72	3.27	8.26	4.29	3.36	3.23	5.20	4.26	3.95	7.67	3.34
Drug Use if asthmatic	64.4	72.09	68.6	*74.51*	71.59	72.57	61.48	**49.98**	70.15	**60.00**	65.21	70.11
Arthritis Diagnosed	22.1	10.85	24.10	26.24	31.00	11.97	18.37	31.30	9.95	28.33	10.08	11.54
Drug Use if have Arthritis	49.2	56.09	**46.52**	**41.28**	57.48	53.36	*57.86*	**40.16**	**45.13**	**48.47**	52.65	**43.44**
Heart Attack Diagnosed	12.01	9.37	14.87	8.78	14.23	11.64	12.75	11.10	11.02	11.14	17.19	6.90
Drug Use if had a heart attack	91.7	90.63	94.27	89.20	94.55	93.67	*94.65*	93.82	**88.50**	91.07	**86.87**	92.64
Stroke Diagnosed	3.6	4.23	4.00	5.41	3.69	4.26	3.73	3.14	4.64	2.13	5.07	2.38
Drug Use if had a stroke	84.2	**84.05**	**84.38**	**75.70**	89.21	**79.49**	**80.78**	*94.03*	**78.30**	82.42	**80.60**	82.72

Note: italics indicate the country with the highest rate, bold indicate statistically significant differences (5%) relative to the country with the highest rate.

It is even more revealing to examine medication for each of the diagnosed conditions. One-third of older Europeans report a diagnosis of hypertension, a prevalence rate comparable with those reported in clinical studies (Brindel et al., 2006; Efstratopoulos et al., 2006). In France, 93% of those reporting hypertension receive medication, which is significantly higher than in all other countries except Switzerland. The rate is only 67% in Belgium. On average, one-fifth of older Europeans have high-blood cholesterol, but there is substantial variation in prevalence from 13% in Switzerland to 29% in Belgium[18]. Just over three-fifths of older Europeans with high cholesterol use cholesterol lowering drugs, but the rate in France is four-fifths, which is significantly higher than all other countries. Four-fifths of those diagnosed with diabetes report taking related medication, which accords with the high compliance rate for diabetes medication reported in the medical literature (Rubin, Peyrot, & Siminerio, 2006; Rozenfeld, Hunt, Plauschinat, & Wong, 2003). Yet, there are significant cross-country differences in compliance, the rate being highest in Austria (85%) and lowest in Denmark (70%) and Sweden (69%). Two European studies (Cerveri et al., 1999; Vermeire, Rabe, Soriano, & Maier, 2002) found a median compliance of asthmatic patients with medical treatment of 67% and wide variations across countries. Our estimates are very close to those of the clinical studies, with two-thirds of the 4.5% with a diagnosis of asthma reporting use of related medication. Take-up of asthma medication is significantly lower in Italy (50%) and Spain (60%) than in the other countries.

The clinical literature demonstrates that adherence to medication for arthritis is relatively poor (50-82%), estimates varying with the method used to measure

[18] Although our estimates refer to an older age group, they are broadly consistent with those obtained by the WHO MONICA project (Tolonen, Keil, Ferrio, Evans, & for the WHO MONICA Project, 2005) .

compliance (Hill, 2005; Tuncay, Eksioglu, Cakir, Gurcay, & Cakci, 2007; Elliott, Ross-Degnan, Adams, Safran, & Soumerai, 2007). We estimate that one-half of older Europeans diagnosed with arthritis are currently under weekly medication treatment. Use of medication is again higher in France, but also in Greece and Austria. Poor adherence to medication for rheumatoid arthritis has been found to be associated with serious adverse effects of the drugs, beliefs that the drugs are of poor effectiveness and the cost of the drugs (Elliott et al., 2007).

Since the aetiology of cardiovascular disease involves many interrelating factors, including hypertension and high-blood cholesterol, we examine whether individuals diagnosed as having suffered a heart attack or stroke, or those with a heart disease, report use of drugs for either high cholesterol, high blood pressure, coronary or cerebrovascular disease or other heart diseases. Heart attack and stroke are serious life threatening conditions and any cross-country variation in medication for their treatment is of great interest. With the exceptions of Sweden, the Netherlands and Denmark, medication rates for individuals that have suffered a heart attack or disease are above 90%. For stroke, the highest rate of medication use is observed in Italy (94%) with most of the other countries having statistically significant lower rates (with the exception of Spain, France and Switzerland).

To summarise, there are cross-country differences in medication for older Europeans with the same medical conditions. This variation is less marked for diabetes and much more distinct for asymptomatic conditions like hypertension and high blood cholesterol. Use of medication is consistently high in France and, albeit less consistently, lower in northern European countries such as Sweden, Denmark and the Netherlands, but also Switzerland.

3.4.3 CONTROL VARIABLES

We distinguish between three categories of control variables: health care need factors, enabling socioeconomic factors and organizational factors. Regarding the former we include gender specific age dummies (50-59 and 60-69, with 70+ being the reference category). To account for the severity of the respondents health condition we include indicators of overweight and obesity[19], current and past smoking status, presence of symptoms, cognitive functioning (numeric and orientation), mobility limitations, limitations with Instrumental Activities of Daily Living (IADL), depression, and dummies for self-perceived health status. Cognitive functioning (numeracy and orientation in time) is included both as an additional indicator of health status and because low cognitive ability may be expected to constrain appropriate use of medication.Variable definitions and means are given in Table 3.6.

[19] Endogeneity is a possibility since corticosteroids that are used for both asthma and arthritis increase BMI. This is unlikely to be strong enough to bias the result of the pooled analysis, although it could do so in the specific analyses of these two conditions. But even in this case the result will be to overcorrect for differences in population need such that the residual cross-country variation is a conservative estimate of the variation not attributable to population characteristics.

Table 3.6: Sample Means of Control Variables

Variables	Variable Description	ALL	At least one Condition	AU	BG	DK	FR	DE	GR	IT	NL	SP	SE	CH
male 50-59	1 if male aged 50-59 years (ref: female aged 70+)	0.17	0.13	0.18	0.17	0.20	0.18	0.17	0.16	0.16	0.21	0.17	0.18	0.20
female 50-59	1 if female aged 50-59 years	0.18	0.13	0.19	0.18	0.20	0.19	0.16	0.16	0.17	0.21	0.17	0.18	0.20
male 60-69	1 if male aged 60-69 years	0.14	0.15	0.14	0.14	0.14	0.13	0.17	0.16	0.14	0.14	0.13	0.14	0.16
female 60-69	1 if female aged 60-69 years	0.16	0.17	0.16	0.15	0.15	0.14	0.18	0.17	0.16	0.14	0.14	0.14	0.15
male 70+	1 if male aged >70	0.21	0.16	0.12	0.15	0.12	0.14	0.12	0.15	0.14	0.12	0.16	0.15	0.13
symptoms	Number of symptoms [+]	2.05	2.03	1.33	1.92	2.03	2.60	1.58	1.61	2.57	1.53	1.89	3.21	1.01
numeracy	1-5 score increasing in performance on two numerical calculations	3.15	3.01	3.61	3.25	3.44	3.05	3.56	3.27	2.82	3.53	2.43	3.56	3.72
orientation	1-5 score increasing in awareness of date, month, year and day of week	3.72	3.68	3.80	3.75	3.75	3.69	3.78	3.77	3.76	3.70	3.56	3.78	3.83
mobility	1 if ≥3 limitations in motor skills & strength[++]	0.25	0.34	0.24	0.24	0.19	0.24	0.24	0.28	0.27	0.19	0.34	0.20	0.13
depression	1 if depressed (EURO-D scale)	0.29	0.34	0.20	0.26	0.18	0.33	0.21	0.25	0.36	0.21	0.36	0.21	0.19
overweight	1 if overweight (BMI 25 – 29.9) (ref: normal/ underweight)	0.42	0.44	0.43	0.42	0.38	0.39	0.44	0.48	0.43	0.42	0.45	0.40	0.37
obese	1 if obese (BMI over 30)	0.18	0.21	0.19	0.18	0.14	0.15	0.17	0.19	0.17	0.15	0.23	0.14	0.13
never smoked	1 if never smoked daily for at least one year (ref:smoker)	0.56	0.58	0.63	0.52	0.36	0.59	0.57	0.57	0.56	0.39	0.62	0.46	0.56
former smoker	1 if former smoker	0.26	0.27	0.18	0.31	0.33	0.27	0.25	0.18	0.26	0.37	0.21	0.37	0.24
iadl	1 if ≥1 IADL limitations	0.17	0.22	0.17	0.19	0.17	0.18	0.15	0.19	0.16	0.16	0.24	0.17	0.08
very good health	1 if self-reported health very good (ref:bad/very bad)	0.13	0.06	0.17	0.18	0.24	0.13	0.11	0.22	0.08	0.18	0.10	0.27	0.32
good health	1 if self-reported health good	0.43	0.38	0.43	0.49	0.45	0.48	0.42	0.39	0.40	0.50	0.40	0.35	0.48
fair health	1 if self perceived health Fair	0.33	0.39	0.30	0.25	0.22	0.29	0.32	0.30	0.38	0.26	0.32	0.27	0.16
single	1 if live as single 0 if live with spouse/ partner	0.34	0.36	0.39	0.27	0.34	0.31	0.34	0.33	0.35	0.31	0.36	0.37	0.31
employed	1 if employed/self-employed (ref: retired)	0.26	0.19	0.21	0.22	0.38	0.27	0.28	0.25	0.20	0.30	0.23	0.39	0.41
inactive	1 if unemployed/permanently sick/disabled/homemaker	0.23	0.24	0.16	0.25	0.09	0.17	0.18	0.28	0.25	0.34	0.41	0.06	0.14
secondary educ	1 if highest level of education (ISCED-.3, 4) (ref: low education- ISCED 0,1,2)	0.47	0.45	0.76	0.48	0.67	0.35	0.73	0.30	0.35	0.61	0.26	0.34	0.51
tertiary educ	1 if highest level of education (ISCED 5-6)	0.18	0.16	0.24	0.23	0.33	0.19	0.26	0.15	0.08	0.20	0.08	0.29	0.28
log income	logarithm of equivalent gross annual household income	9.67	9.64	9.80	9.82	10.33	9.94	9.90	9.00	9.37	10.05	8.94	10.19	10.37
urban	1 if individuals lives in a big city, large town or suburbs of big city, 0 if in small town or village	0.30	0.30	0.34	0.21	0.36	0.22	0.27	0.60	0.26	0.29	0.48	0.42	0.17

+ Individuals were asked if they were bothered with symptoms in the past six months: 1) pain, knees, hips, joints, 2) heart trouble, angina, chest pain; 3) breathlessness; 4) persistent cough; 5) swollen legs; 6) sleeping problems; 7) falling down and fear of falling down; 8) dizziness faints or blackouts; 9) stomach or intestine problems; 10 incontinence.

++ A score of 1-5 was used.The higher the score the better +++Individuals were asked if they had difficulties with: 1) walking 100 meters; 2) sitting for two hours; 3) getting up from a chair; 4) climbing one or several flights of stairs without resting; 5) stooping, kneeling or crouching; 6) reaching or extending arms above shoulder level; 7) pulling/pushing larges objects; 8) lifting weights over 10 pounds/5 kilos; 9) picking up a small coin from a table.

Variables that have been shown in the literature to affect pharmaceutical utilization but are not direct indicators of health status include education level, economic activity, marital status and income (see Table 3.6 for definitions). The latter is measured as equivalent gross annual household income, which includes income received from employment and self-employment, private non-labor income (investments, property and transfers) and pensions. Adjustments for household size and composition were made using the OECD-modified equivalence scale[20].

Table 3.6 presents sample pooled and country-specific means for all control variables for both the full sample and the restricted sample of all those diagnosed with any of the selected conditions. The disease-specific sample is older, somewhat less educated, less economically active and have slightly lower income. Prevalence of symptoms, mobility and IADL limitations, cognitive difficulties, and obesity are all higher among individuals with a diagnosed condition. Depression, which is strongly associated with poor adherence to medication, is much more prevalent in the sample with a condition. Smoking is regarded as a main risk factor for many of the diseases under study, so it is perhaps not surprising that those with a condition are much more likely to have quit smoking.

There are also substantial cross-country differences in the health indicators. The mean number of symptoms ranges from 1 in Switzerland to 3.2 in Sweden. The proportion reporting very good health varies from 8% in Italy to 32% in Switzerland, while the proportion of those with depression ranges from 18% in Denmark to 36% in Spain. Differences are also observed in the socio-economic factors. For example, the

[20] The scale assigns a value of 1 to the household head, of 0.5 to each additional adult member and 0.3 to each child aged below 13 years.

proportion with tertiary education ranges from 8% in Italy to 33% in Denmark, while the proportion employed ranges from 20% in Italy to 40% in Switzerland.

3.5 Results

Using the full sample of SHARE respondents pooled across all countries, we first analyze variation in the probability of using medication for any of the conditions listed above across both those reporting a diagnosed condition and those reporting no such diagnosis[21]. While these might be characterized as appropriate and inappropriate use respectively, this is not entirely accurate since some medications might be used for other diseases or co-morbidities and there will be errors in the reporting of diagnosed conditions. Nevertheless, since variation in medication across individuals for whom drug treatment is appropriate given their pathology is of greater concern, we also conduct the analysis on the restricted sample of respondents who report a diagnosed condition. Further, we repeat the analysis for each specific condition.

3.5.1 Total Cross-Country Variation in Utilization

Average country-specific residuals, and their bootstrapped confidence intervals, are presented in Table 3.7and Table 3.8 for the full and restricted (diagnosed condition) samples respectively. The first column in each table gives the residuals from a bivariate probit model of the probability of utilization (and diagnosis) including a constant only, thus showing the deviations from the average utilization rate across all individuals in the pooled sample. The respective MSD measures the total variation in utilization across countries.

[21] The questionnaire first asks whether the individual has a particular diagnosed condition. It then asks all respondents whether they take medication for this condition.

Table 3.7: Country-specific mean residuals and cross-country mean squared deviation (MSD) of pharmaceutical utilization. Not conditional on reported diagnosis. Estimates obtained from bivariate probit models of reported diagnosis and utilization.

	Model 0: no covariates		Model 1: Health & demographics		Model 2: Health. demographics & socioeconomics		Model 3: Health, demographics, socioeconomics & organizational		Model 4: Model 3 with restricted specification of organizational factors	
	Mean	95 CI	Mean	95 CI	Mean	95 CI	Mean	95 CI	Mean	95 CI
Austria	0.00871	(-0.015 to 0.033)	-0.00416	(-0.026 to 0.012)	-0.00775	(-0.027 to 0.011)	-0.01902*	(-0.034 to -0.002)	-0.00850	(-0.026 to 0.011)
Belgium	0.04070*	(0.026 to 0.055)	0.05127*	(0.039 to 0.066)	0.04709*	(0.035 to 0.060)	0.04253*	(0.033 to 0.053)	0.03854*	(0.028 to 0.050)
Denmark	-0.06411*	(-0.088 to -0.040)	-0.01926	(-0.039 to 0.042)	-0.02156*	(-0.043 to -0.001)	-0.00277	(-0.017 to 0.012)	-0.00468	(-0.019 to 0.010)
France	0.08975*	(0.073 to 0.107)	0.08573*	(0.071 to 0.099)	0.08316*	(0.069 to 0.097)	0.04496*	(0.034 to 0.056)	0.04791*	(0.035 to 0.059)
Germany	0.00946	(-0.008 to 0.027)	-0.01619*	(-0.031 to 0.002)	-0.01741*	(-0.032 to -0.004)	-0.00795	(-0.018 to 0.004)	-0.00655	(-0.019 to 0.004)
Greece	-0.01866	(-0.037 to 0.000)	0.01732*	(0.002 to 0.031)	0.02538*	(0.012 to 0.040)	-0.00111	(-0.009 to 0.006)	-0.00331	(-0.011 to 0.004)
Italy	0.03363*	(0.015 to 0.053)	-0.02411*	(-0.041 to -0.008)	-0.02571*	(-0.042 to -0.008)	-0.01233*	(-0.024 to -0.001)	-0.00744	(-0.019 to 0.004)
Netherlands	-0.08866*	(-0.107 to -0.072)	-0.04837*	(-0.063 to -0.033)	-0.04898*	(-0.064 to -0.034)	-0.04144*	(-0.051 to -0.031)	-0.05484*	(-0.066 to -0.043)
Spain	0.05570*	(0.034 to 0.075)	-0.02910*	(-0.046 to -0.012)	-0.02153*	(-0.039 to -0.005)	-0.01662*	(-0.030 to -0.004)	-0.01877*	(-0.031 to -0.006)
Sweden	-0.05759*	-0.074 to -0.038)	-0.03243*	(-0.047 to -0.015)	-0.03027*	(-0.047 to -0.016)	0.01650*	(0.006 to 0.027)	0.01336*	(0.002 to 0.026)
Switzerland	-0.07775*	(-0.110 to -0.048)	0.01656	(-0.010 to 0.043)	0.01147	(-0.016 to 0.036)	-0.02719	(-0.047 to 0.007)	0.00881	(-0.016 to 0.034)
MSD	0.00321436		0.00145203		0.00137936		0.00066924		0.00069069	
Explained variation as % of model 0 MSD			54.8%		57.1%		79.2%		78.5%	

Residuals calculated as in (5) and MSD as in (6).

95 CI – 95% bootstrap confidence intervals; * significant at 5%. Model 4 is as model 3 but with regulation of retailing and retail price omitted.

Table 3.8: Country-specific mean residuals and cross-country mean squared deviation (MSD) of of pharmaceutical utilization. Conditional on reported diagnosis. Estimates obtained from bivariate probit models of reported diagnosis and medication

	Model 0: no covariates		Model 1: Health & Demographics		Model 2: Health. demographics & Socioeconomics		Model 3: Health, demographic. socioeconomic & organizational		Model 4: Model 3 with restricted specification of organizational factors	
	Mean	95 CI	Mean	95 CI	Mean	95 CI	Mean	95 CI	Mean	95 CI
Austria	0.03108*	(0.011 to 0.053)	0.01742	(-0.004 to 0.037)	0.01555	(-0.005 to 0.035)	0.00256	(-0.016 to 0.021)	0.01393	(-0.004 to 0.036)
Belgium	-0.01500*	(-0.029 to -0.001)	0.00200	(-0.011 to 0.016)	-0.00036	(-0.013 to 0.013)	0.00130	(-0.009 to 0.012)	-0.00261	(-0.014 to 0.009)
Denmark	-0.07565*	(-0.101 to -0.048)	-0.04666*	(-0.074 to -0.021)	-0.04609*	(-0.072 to -0.020)	-0.03632*	(-0.053 to -0.021)	-0.03903*	(-0.057 to -0.024)
France	0.04459*	(0.028 to 0.057)	0.05019*	(0.036 to 0.065)	0.04955*	(0.035 to 0.064)	0.00172	(-0.008 to 0.012)	0.00447	(-0.007 to 0.015)
Germany	0.03436*	(0.018 to 0.049)	0.01510*	(0.000 to 0.029)	0.01349	(-0.001 to 0.027)	0.01809*	(0.006 to 0.030)*	0.01889*	(0.005 to 0.032)
Greece	0.03055*	(0.018 to 0.051)	0.02944*	(0.014 to 0.047)	0.03511*	(0.019 to 0.051)	0.02202*	(0.011 to 0.033)*	0.01928*	(0.007 to 0.030)
Italy	-0.02715*	(-0.048 to -0.013)	-0.04495*	(-0.062 to -0.027)	-0.04680*	(-0.063 to -0.029)	-0.02797*	(-0.042 to -0.016)	-0.02299*	(-0.036 to -0.009)
Netherlands	-0.03085*	(-0.051 to -0.010)	-0.01146	(-0.032 to 0.008)	-0.01304	(-0.033 to -0.006)	-0.00448	(-0.016 to 0.010)	-0.01865*	(-0.032 to -0.003)
Spain	0.00443	(-0.016 to 0.021)	-0.03159*	(-0.050 to -0.013)	-0.02827*	(-0.046 to -0.011)	-0.03384*	(-0.048 to -0.019)	-0.03611*	(-0.052 to -0.022)
Sweden	-0.02406*	(-0.042 to -0.004)	-0.01231	(-0.030 to 0.005)	-0.01046	(-0.029 to 0.006)	0.04341*	(0.030 to 0.056)	0.04012*	(0.026 to 0.055)
Switzerland	0.01463	(-0.018 to 0.047)	0.05404*	(0.024 to 0.086)	0.05082*	(0.020 to 0.082)	0.01167	(-0.016 to 0.036)	0.05403*	(0.023 to 0.084)
MSD	0.00122747		0.00111635		0.00109574		0.00055225		0.00080661	
Explained variation as % of model 0 MSD			9.1%		10.7%		55.0%		34.3%	

95 CI – 95% bootstrap Confidence Intervals; * significant at 5%. Model 4 is as model 3 but with regulation of retailing and retail price omitted.

The first column of Table 3.7 confirms substantial and significant variation between countries, with France and the Netherlands representing the extremes. A person in France has a 0.09 greater probability of using medication than the average across the pooled sample, while the probability for a Dutch person is 0.09 less than the average. Besides these two countries, utilization rates are significantly (5%) above the average in Belgium, Italy and Spain, and significantly below the average in Denmark, Sweden and Switzerland. Among those reporting a diagnosed condition (Table 3.8), the probability of taking medication for such a condition is significantly above average in Austria, France, Germany and Greece, and significantly below average in Belgium, Denmark, Italy, the Netherlands and Sweden. Note that all Belgians and Italians are more likely than the average European to use medication, but among Belgians and Italians with a diagnosed condition utilization is less than average. This indicates a very high level of utilization among reporting no diagnosis in these two countries.

3.5.2 Variation Explained by Differences in Population Health

Table 3.9 and Table 3.10 presents the partial effects of covariates on the probability of using medication unconditional and conditional on reported diagnosis respectively. Both sets of partial effects are computed from the same bivariate probit model of reported diagnosis and medication. In table Table 3.9, the partial effects are derived from equation (3). In Table 3.10, they are derived from equation (4). In all specifications, the correlation coefficient between the unobservable determinants of reported diagnosis and medication is positive and strongly significant, confirming that the bivariate probit is preferable to a simple probit for medication estimated on a sample reporting a diagnosis.

Both sets of results confirm a strong impact of health status and demographics on medication. Those below 70, particularly those below 60, are less likely to receive medication. The presence of symptoms, mobility difficulties and obesity/overweight all significantly raise the likelihood of using medication. Those who have quit smoking are significantly more likely to take up medication compared to current smokers, which suggests health played a role in the decision to quit. Uncomditional on reported diagnosis (Table 3.9), medication is also higher for those who have never smoked. Better self-assessed health reduces the probability of using medication. People with depression are less likely to use are less likely to use drugs, which is in line with medical literature suggesting this factor is associated with poor adherence to medication (Stilley et al, 2004; Osterberg & Blaschke, 2005). Unconditional on reported diagnosis, better numeracy skills are associated with a lower probability to be on medication, while the opposite is true for cognition measured by orientation. The latter is consistent with the better orientated adhering more with medication.

Differences in the health and demographic status of populations explain just over half of the between-country variation in the probability of using pharmaceuticals across all individuals irrespective of whether they report a diagnosis (Table 3.7, column 2). This is also reflected in the fact that the average country-specific residuals fall in magnitude. Conditional on health, utilization remains significantly greater than average in Belgium, Greece and France, with France having still the highest rate of utilization. Sweden and the Netherlands continue to have lower than average utilization, but this is no longer true for Switzerland once allowance is made the good health of its population. Italy and Spain move from having above to below average utilization, indicating that the apparent above average propensity to use medication is entirely attributable to the fact that their populations are older and in poorer health.

Among those with a diagnosed condition, the remaining health indicators explain much less of the between-country variation in utilization rates – the explained variation being only 9% of the total (Table 3.8, column 2). This is to be expected since the presence of a diagnosed condition is the strongest determinant of the receipt of medication and there is less variation in health status across those with such a condition than in the full sample. After controlling for health and demographic status, the propensity to use medication remains above the average in France, Germany and Greece. The magnitude of the residual of France rises, indicating that the good health status of its population obscures the true extent to which the utilization is greater than in other countries. The same is true of Switzerland. Denmark and Italy remain below the average, with the magnitude of the residual rising in Italy, indicating that the age and relatively poor health of its population obscures the extent to which pharmaceuticals are under-utilized relative to other European countries. The same holds for Spain. On the other hand, the Netherlands and Sweden no longer lie significantly below the average once account is taken of the better health of their populations..

Table 3.9: Partial Effects on probability of pharmaceutical utilization not conditional on reported diagnosis. Derived from bivariate probit models of reported diagnosis and utilization

	Model 1	Model 2	Model 3	Model 4
male 50-59	-0.268*** (0.012)	-0.235*** (0.014)	-0.243*** (0.014)	-0.242*** (0.014)
memale 50-59	-0.281*** (0.011)	-0.257*** (0.012)	-0.262*** (0.012)	-0.261*** (0.013)
male 60-69	-0.100*** (0.013)	-0.095*** (0.016)	-0.098*** (0.014)	-0.097*** (0.014)
female 60-69	-0.112*** (0.012)	-0.108*** (0.012)	-0.108*** (0.012)	-0.107*** (0.012)
male 70+	-0.006 (0.013)	-0.009 (0.014)	-0.012 (0.016)	-0.012 (0.014)
symptoms	0.131*** (0.008)	0.130*** (0.008)	0.132*** (0.008)	0.132*** (0.008)
numeracy	-0.009*** (0.003)	-0.010 (0.003)	-0.009 (0.004)	-0.009 (0.004)
orientation	0.017*** (0.006)	0.018*** (0.006)	0.017 (0.006)	0.018*** (0.006)
mobility	0.118*** (0.010)	0.117*** (0.012)	0.115*** (0.010)	0.115*** (0.010)
depression	-0.002*** (0.009)	-0.002***(0.009)	-0.008*** (0.009)	-0.008 (0.009)
overweight	0.105*** (0.007)	0.105*** (0.007)	0.105*** (0.007)	0.104*** (0.007)
obese	0.206*** (0.009)	0.207*** (0.009)	0.206*** (0.009)	0.205*** (0.009)
never smoked	0.036 *** (0.009)	0.034 (0.009)	0.033*** (0.009)	0.034*** (0.009)
former smoker	0.082*** (0.010)	0.079*** (0.010)	0.083*** (0.010)	0.081*** (0.010)
iadl	-0.016 (0.011)	-0.018 (0.011)	-0.016 (0.011).	-0.018 (0.011)
very good health	-0.392*** (0.013)	-0.385*** (0.013)	-0.391*** (0.013)	-0.391*** (0.013)
good health	-0.196*** (0.014)	-0.191*** (0.015)	-0.200*** (0.015)	-0.200*** (0.015)
fair health	-0.034** (0.014)	-0.029** (0.014)	-0.035** (0.015)	-0.035** (0.015)
single		-0.000 (0.008)	-0.003 (0.008)	-0.001 (0.008)
employed		-0.056*** (0.011)	-0.051*** (0.011)	-0.053*** (0.011)
inactive		-0.008 (0.010)	0.010 (0.010)	-0.013 (0.010)
secondary educ		-0.002 (0.008)	-0.003 (0.008)	-0.001 (0.008)
tertiary educ		0.002 (0.010)	-0.000 (0.010)	0.001 (0.010)
log income		0.011*** (0.003)	0.015*** (0.003)	0.015*** (0.003)
urban		-0.016** (0.007)	-0.013 (0.007)	-0.017 (0.007)
pharmacy density			0.012*** (0.002)	0.008*** (0.002)
physician density			-0.044*** (0.014)	-0.029 (0.013)
physician density*urban			-0.019 (0.012)	-0.007 (0.012)
retail restrictions			0.023*** (0.007)	
incentives			-0.045*** (0.006)	-0.041*** (0.006)
retail price			0.001*** (0.000)	
patient cost sharing			-0.001*** (0.000)	-0.001*** (0.000)
payment exemption			0.019*** (0.007)	0.023*** (0.007)
Sample Size	27020	27020	27020	27020
Log likelihood	-26307.044***	-26032.145***	-25955.272***	-25964.748***
Coefficient of correlation (rho)	0.842*** (0.015)	0.0841*** (0.015)	0.836*** (0.017)	0.834*** (0.017)

Notes: Partial effects computed by taking derivates of (or differences in) probability given in equation (3) estimated by bivariate probit. Partial effects on the probability of reporting diagnosis not shown. Estimates are computed at the sample means. Standard errors in parentheses. ***, ** and * significant at 1%, 5% and 10%.

Table 3.10: Partial effects on probability of pharmaceutical utilization conditional on reported diagnosis. Derived from bivariate probit models of reported diagnosis and utilization.

	Model 1	Model 2	Model 3	Model 4
male 50-59	-0.214*** (0.014)	-0.186*** (0.015)	-0.195*** (0.016)	-0.194*** (0.019)
female 50-59	-0.202*** (0.012)	-0.185*** (0.014)	-0.189*** (0.014)	-0.189*** (0.014)
male 60-69	-0.090*** (0.012)	-0.083*** (0.013)	-0.086*** (0.013)	-0.085*** (0.013)
female 60-69	-0.095***(0.011)	-0.092*** (0.012)	-0.091*** (0.012)	-0.090*** (0.012)
male 70+	-0.007 (0.012)	-0.005 (0.012)	-0.007 (0.012)	-0.007 (0.012)
symptoms	0.040*** (0.006)	0.040*** (0.006)	0.043** (0.006)	0.042** (0.006)
numeracy	-0.003 (0.003)	-0.003 (0.003)	-0.002 (0.003)	-0.002 (0.003)
orientation	0.009 (0.005)	0.010* (0.005)	0.009* (0.005)	0.010* (0.005)
mobility	0.072*** (0.008)	0.071*** (0.008)	0.070*** (0.008)	0.071*** (0.008)
depression	-0.018** (0.007)	-0.018** (0.007)	-0.024*** (0.008)	-0.024*** (0.008)
overweight	0.058*** (0.006)	0.058*** (0.006)	0.059*** (0.006)	0.058*** (0.006)
obese	0.105*** (0.007)	0.104*** (0.007)	0.104*** (0.007)	0.104*** (0.007)
never smoked	0.011 (0.008)	0.011 (0.008)	0.009 (0.008)	0.010 (0.008)
former smoker	0.028*** (0.008)	0.026*** (0.008)	0.029*** (0.008)	0.028*** (0.008)
iadl	-0.016* (0.010)	-0.017 * (0.010)	-0.016 (0.010)	-0.017 (0.010)
very good health	-0.265*** (0.018)	-0.256*** (0.018)	-0.261***(0.019)	-0.261*** (0.019)
good health	-0.125*** (0.013)	-0.121*** (0.013)	-0.128*** (0.013)	-0.129*** (0.013)
fair health	-0.038*** (0.013)	-0.034*** (0.013)	-0.039*** (0.013)	-0.038*** (0.013)
single		0.003 (0.007)	-0.002 (0.007)	0.000 (0.007)
employed		-0.032*** (0.009)	-0.029*** (0.009)	-0.030*** (0.009)
inactive		0.033 (0.008)	0.002 (0.009)	-0.001 (0.009)
secondary educ		0.001 (0.007)	-0.002 (0.008)	-0.000 (0.007)
tertiary educ		-0.006 (0.008)	-0.010 (0.009)	-0.001 (0.008)
log income		0.002 (0.003)	0.003 (0.003)	0.0093 (0.003)
urban		-0.010* (0.006)	-0.004* (0.005)	-0.009* (0.004)
pharmacy density			0.013*** (0.002)	0.008*** (0.002)
physician density			-0.067*** (0.012)	-0.051*** (0.012)
physician density*urban			-0.028* (0.013)	-0.015 (0.013)
retail restrictions			0.024*** (0.008)	
incentives			-0.048*** (0.007)	-0.044*** (0.007)
retail price			0.001*** (0.000)	
patient cost sharing			-0.001*** (0.000)	-0.001*** (0.000)
payment exempt			0.020*** (0.007)	0.024*** (0.007)
Sample Size	27020	27020	27020	27020
Log-Likelihood	-26307.044***	-26032.145***	-25955.272***	-25964.748***
Coefficient of correlation (rho)	0.842*** (0.015)	0.841*** (0.015)	0.836*** (0.017)	0.834*** (0.017)

Notes: Partial effects computed by taking derivates of (or differences in) probability given in equation (4) estimated by bivariate probit. Partial effects on the probability of reporting diagnosis not shown. Estimates are computed at the sample means. Standard errors in parentheses. ***, ** and * significant at 1%, 5% and 10%

3.5.3 Variation Explained by Socioeconomic Characteristics

Employed individuals are less likely to use medication. There are no significant differences by education, which contrasts with US evidence showing that the more highly educated have better access to medication (Cutler & Lleras-Muney, 2006). There is a positive and significant income effect in the full sample, which is no longer present once attention is restricted to those with a diagnosed health condition. This suggests that it is higher income individuals without a diagnosis that are more likely than their lower income counterparts to use medication. We have tested for evidence of an income effect varying across countries, possibly due to differences in cost-sharing arrangements, but never rejected the null of no income-country interactions.

The modest impact of socioeconomic characteristics on the propensity to utilize drugs results in a negligible contribution to explanation of between-country differences. In the unconditional analysis, after controlling for health and demographics, socioeconomics add 2.3% to the explanation of cross-country variation. Restricting attention to those reporting a diagnosis, socioeconomics add 1.6%. In both cases, controlling for socioeconomic characteristics has no noteworthy impact on the country-specific residuals.

3.5.4 Variation Explained by Organizational Factors

In the third column of Table 3.9 and Table 3.10 we give partial effects from models including the policy amenable supply and demand side characteristics of the pharmaceutical sector that were described in Table 3.4. In both the unconditional and conditional analyses, a higher density of pharmacies has a significant positive effect on the propensity to use medication. This is consistent with an "availability effect", namely a positive association between supply and consumption. Physician supply, however, is negatively associated with drug utilization in both samples. This is

consistent with doctor visits acting as a substitute for pharmaceuticals. Higher physician density might result in more time spent in consultations with patients, which has been found to be associated with less frivolous prescribing (Lundkvist, Akerlind, Borgquist, & Molstad, 2002). This substitution effect is stronger in urban that rural areas, although not significantly so in the unconditional analysis. Perhaps surprisingly, the propensity to use medication is greater in countries where the retailing of pharmaceuticals is highly regulated.

The propensity to use pharmaceuticals is lower in countries that provide financial incentives to doctors to constrain their prescribing. The probability of receiving medication is 4.5 percentage points lower in such countries. Among those reporting a diagnosis, it is 4.8 points lower. This is in accordance with the findings in the literature that financial incentives are not only effective in reducing prescribing costs but also the volume of drugs prescribed (Sturm et al., 2007).

Conditional on the average gross of reimbursement price, the average proportion of the cost incurred by patient is significantly negative correlated with drug utilization. This is consistent with a price effect, found in many studies of the demand for pharmaceuticals, that might stem from the patient choosing to forgo medication and/or the costs incurred by the patient impacting on the prescriber's behaviour (Hassell et al., 2003). Of course, we should be cautious in interpreting the effect as an estimate of the causal impact of patient cost on utilization since it is identified only from cross-country variation and average costs that overlook much of the complexity of reimbursement policies. Gross of reimbursement retail prices are positively correlated with the propensity to use pharmaceuticals. This is inconsistent with the expected negative price effect. This may derive from the difficulty of identifying the effect from country level variation alone, or it could be that the correlation is picking

up not the impact of price on demand, but that of demand on price. This could materialise even in the absence of market determined prices. In countries where cultural and/or institutional factors propel a vigorous demand for medicines, the pharmaceutical companies are in a stronger position to negotiate higher prices. Utilization is significantly higher when the individual is exempt from, or faces reduced, cost-sharing on the basis of the diagnosed condition reported.

Pharmaceutical and healthcare system organizational characteristics explain an additional 22% of the between-country variation, bringing the explained variation to 79% of the total (Table 3.7, column 3). The magnitudes of most of the country-specific residuals decline when control is made for organizational factors further indicating that system level characteristics are partly responsible for the differences in utilization rates. France and Belgium remain above the average, and although France remains the country with the highest rate of medication, the fall in the residual is very marked. This suggests that policies in operation in France have much to do with the high utilization of pharmaceuticals found there. Most important would appear to be the near full reimbursement of costs and the absence of incentives to constrain prescribing behaviour. Conditional on institutional factors, Sweden has higher than average utilization, which is consistent with policies, such as the system of financial incentives linked to prescribing behaviour, helping to constrain utilization. After controlling for organizational factors, residual utilization rates fall but remain below the average in Italy, the Netherlands and Spain, which is consistent with policies being only partly responsible for their low rates. Notable are the low densities of pharmacies in the Netherlands and the financial incentives to constrain prescribing behaviour in Italy. The residual utilization rate also becomes significantly less than

average in Austria, suggesting factors other than those controlled for in the regression are responsible for the relatively low utilization.

.

Restricting attention to medication received by those with a diagnosed condition, given that individual level health and demographic factors play less of a role in explaining cross-country variation in utilization, one would expect country level organizational factors to be relatively more important. This is confirmed, with the explained cross-country variation rising from around 11% to 55% when organizational factors are taken into account (Table 3.8, column 3). France moves from having the highest rate of medication to one not significantly different from the average, indicating that the organizational factors controlled for explain all of its excess utilization. Greece continues to have rates of use above the average although the excess falls, which is mostly attributable to the very high density of pharmacies. Germany and Sweden move above the average after controlling for institutional factors, while Switzerland is no longer significantly above the average. Denmark, Italy and Spain all remain below the average with the deficit declining for the first two after taking account of the policies they have in place that appear to help constrain utilization.

Two of the country-level organizational variables— retailing restrictions and the gross of reimbursement price—take what are arguably the 'wrong' signs in the regressions. It is possible that these variables are picking up the effects of correlated omitted factors, and so we are less confident that they are capturing the effect of different policy environments. In order to avoid over attributing the cross-country variation to policy-determined factors, we repeat the analysis dropping the two

variables from the models. The results are given in the final columns of Tables 3.7-3.10. The partial effects of the remaining institutional factors are generally robust to dropping the these variables, although the effects of pharmacy and physician density fall in magnitude and the latter becomes insignificant in the unconditional analysis [22]. The proportion of the cross-country variation that is explained hardly changes in the unconditional analysis but falls from 55% to 34% across those reporting a diagnosis. Still, the remaining institutional factors explain 23.6% of the variation for this group. Even with this more conservative specification of proxies for differences in pharmaceutical policy instruments, it appears that almost a quarter of the cross-European variation in the receipt of medications among older individuals with conditions known to respond to drug therapy can be explained by differences in the availability of pharmacies, the presence of incentives to constrain doctors' prescribing and levels of patient cost-sharing.

3.5.5 Variation in Medication for Specific Diagnosed Conditions

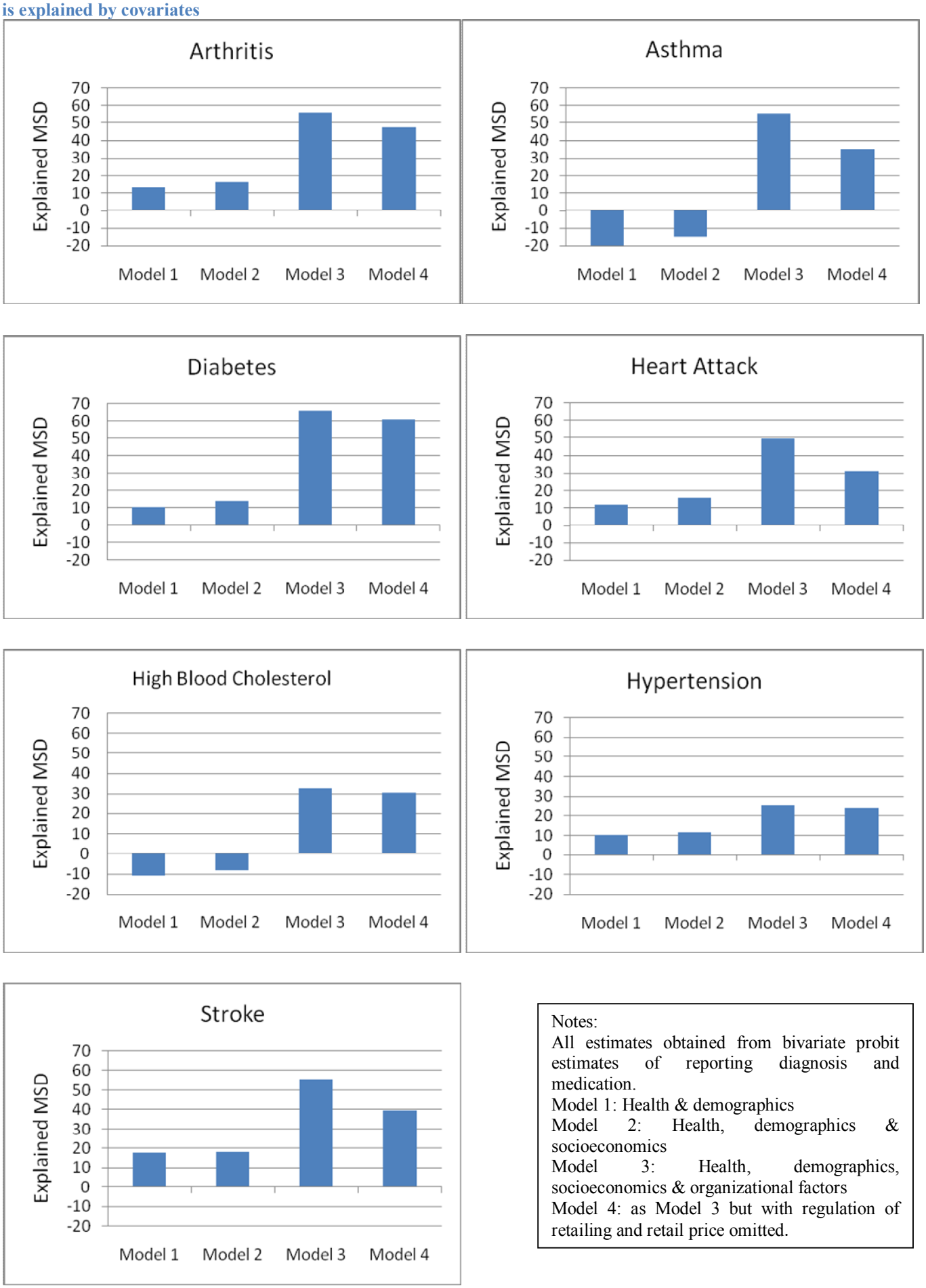
The analysis is repeated for the utilization of medication specific to each condition and the results are summarized in Fiture 3-III. For each of condition, the period since first diagnosis is controlled for along with a set of health variables selected according to Akaike/Bayesian Information Criteria. In the cases of Asthma and High Blood Cholesterol the MSD actually increases when health and demographic are entered into the model and for cholesterol this is also true for the addition of socioeconomic factors[23]. This indicates that cross-country differences in the distributions of these

[22] A test for the joint significance of physician density and the interaction term leads to clear rejection of the hypothesis of 'no effect' with associated p-value of 0.000, indicating that physician density has a significant effect in urban areas.

[23] The MSD is not necessarily decreasing as regressors are added to the model if, on the basis of covariates, the model predicts utilization relative to other countries in the opposite direction to that observed.

covariates cannot explain the observed differences in utilization rates. For the rest of the diseases, differences in the health and demographic status of the populations with each condition explain between 10% (Hypertension, Diabetes) and 17% (Stroke) of the cross-country variation in utilization. Pharmaceutical and healthcare system organizational characteristics play a relatively important role, explaining an additional 37% (Stroke)-52% (Diabetes) of the variation. When the analyses is repeated dropping the two organizational variables that take the 'wrong' sign, namely retailing restrictions and retail price, the proportion of the cross-country variation that is explained falls substantially in the cases of Asthma, Heart Attack and Stroke. It is notable that for the least symptomatic conditions (heart attack, cholesterol and hypertension) more than two-thirds of the cross-country variability in medication remains unexplained. It is likely that individual factors, such as insight into the illness and beliefs about the benefit of treatment, as well as physicians' attitudes towards medication (Fahey, et al. 2006) play a greater role in determining utilization of pharmaceuticals for these conditions.

Figure 3-III: Percentage of cross-country variation (MSD) in the probability of taking medication for specific diseases that is explained by covariates



Notes:
All estimates obtained from bivariate probit estimates of reporting diagnosis and medication.
Model 1: Health & demographics
Model 2: Health, demographics & socioeconomics
Model 3: Health, demographics, socioeconomics & organizational factors
Model 4: as Model 3 but with regulation of retailing and retail price omitted.

3.6 Discussion

There are substantial differences in the utilization of pharmaceuticals across Europe that carry over into disparities in pharmaceutical expenditures. For example, while 86% of older French men and women with a diagnosed chronic condition are on medication, the equivalent figure in Denmark is only 75%. Differences are even greater across Europeans with the same diagnosis. The extent to which these disparities are attributable to organizational differences in pharmaceutical and health care sectors resulting from policy choices, as opposed to differences in the health of populations or in cultural attitudes to the prescribing and consumption of medicines, must be established if there is to be cost-effective utilization of pharmaceuticals throughout the continent.

Our analysis reveals that differences in population health explain almost half of the cross-country variation in the utilization prescribed medicines among older Europeans. However, after restricting attention to individuals with a diagnosed chronic condition, differences in demographics and health explain only 9% of the cross-country variation, leaving a lot that is attributable to other factors, including organizational differences. Cross-country differences in the distribution of enabling factors, e.g. education and income, play a very modest role in explaining the differences in pharmaceutical utilization. There is little or no evidence of a socioeconomic gradient in need-adjusted medication use in Europe, although higher income individuals reporting no diagnosis are more likely to be on medication.

Among individuals with a diagnosed chronic condition, and after controlling for health, demographic and socioeconomic status, our proxies for organizational factors explain between 24% and 44% of the cross-country variation in utilization.

While we would not suggest that this provides an estimate of the causal effect of these organizational factors on the utilization of medicines, it is consistent with, and suggestive of, a potentially large role for policy differences in explaining the cross-European variation. Across Europe, older individuals with very similar conditions are receiving quite different rates of medication. This suggests differences in the efficiency with which pharmaceuticals are being utilized. Although equal treatment for equal need across the EU has not yet been proposed as an objective, the analysis indicates that this is certainly not being achieved with respect to drug therapies.

Most of the coefficients on institutional variables show the expected signs and are consistent with existing evidence, with higher pharmacy density (Kooiker & van der Wijst, 2003), higher patient reimbursement rates (Lexchin & Grootendorst, 2004; Gemmill et al., 2007) and protection of the chronically-ill from co-payments all being associated with higher probability of drug utilization, while utilization is lower in countries that offer physicians financial incentives to constrain their prescribing (Sturm et al., 2007). On the other hand, we find that pharmaceutical consumption is not lower in countries that place greater restrictions on retailing. One must be somewhat careful in interpreting this result since it is conditional on control for pharmacy density. It could be that retailing restrictions constrain utilization through limiting the supply of pharmacies. But this seems unlikely since the market is most regulated in countries where pharmacy density is highest. The result is certainly not consistent with any substantial impact of regulation of who can sell medicines and of where they can be sold on their rate of utilization. This makes it difficult to defend such regulation as a means of constraining consumption. It is perhaps more plausible that the motivation for such regulation derives from supply side interests. Consumption is actually greater in countries where gross prices are higher. It is

possible that this reflects an effect of strong demand on prices. Particularly in urban areas, utilization is lower in countries with a higher density of physicians, which is consistent with physician time substituting for pharmaceuticals, rather than increasing the number of prescriptions written.

After accounting for observed population health, socioeconomics and organizational factors, 45% (65% in the restricted specification – model 4) of the cross-country variation in pharmaceutical utilization among those diagnosed with a chronic condition remains unexplained. In the cases of hypertension and high blood cholesterol, two rather asymptomatic conditions, as much as two-thirds of variability is left unexplained. This unexplained variation could be due to uncontrolled differences in need—severity of disease or the existence of co-morbidities—and in organizational determinants. However, it will also be due to differences in norms and cultures regarding the prescribing and taking of medication, which may influence the effectiveness of given organizational structures. For example, in the Netherlands evidence based prescribing guidelines are known to be highly valued by health professionals and used in day-to-day practice, while in France there is evidence that they are not adhered to (Durieux et al., 2000). In the Netherlands lifestyle advice is ranked as an equal therapy with medication for the treatment of hypertension, while in France doctors are likely to prescribe expensive pharmaceutical treatment from the first consultation (Kooiker & van der Wijst, 2003).

Patients' attitudes toward the use of pharmaceuticals, and adherence to medication, also differ. Kooiker et al (2003) present evidence that attitudes range from strong pharmaco-centrism in France and Switzerland to drug-reluctance in the Netherlands. These differences may stem from deeper differences in conceptions of illness (Murray et al., 2003; Jüerges, 2007b).,.One study found that Belgians with

upper respiratory symptoms are more likely to label their condition as bronchitis, visit a doctor and receive a prescription, whereas the Dutch most likely report cold or flu and sit it out (Deschepper et al., 2002).

It is difficult to isolate the effect of purely cultural determinants from attitudes that develop in response to information and institutionally fixed incentives. Patient education campaigns in the Netherlands have long advised individuals not to consult their doctor before it is absolutely necessary. Self-medication and the use of OTC drugs is widespread in France compared to the rest of Europe; around 36% of pharmaceutical sales are not on prescription.24 This is due to the fact that almost 70% of the products that can be bought with or without prescription are on the positive list for reimbursement. In the Netherlands, the OTC market is limited as they are not reimbursed, while prescribed drugs are essentially free.

While we do not claim that this study provides conclusive evidence on the causal determinants of pharmaceutical utilization in Europe, together with other available evidence, it does suggest that organizational and cultural factors play important roles in explaining the substantial cross-country variation that exists. We contend that the evidence is sufficient to warrant the exertion of considerable effort by countries to learn how others manage to constrain the utilization of pharmaceuticals. This requires investigation not only of demand and supply side characteristics of the pharmaceutical and health care sectors that are directly amenable to policy in the short to medium term, but also attitudes towards the use and prescription of medicines that may be responsive to information and education campaigns over a longer time horizon.

[24] The data analysed in the present study do not cover OTC medicines.

CHAPTER 4: The Burden of Paying for Health Care in Greece in Comparison with Other European Countries

4.1 Introduction

In Greece, there is heavy reliance on uninsured, out-of-pocket (OOP) payments to finance health care. In fact, Greece is unique among the older European Union (EU) Member States in relying on private sources to contribute the greatest share of health care financing. Not only are private payments for health care high, they are increasing. Private expenditure has increased substantially over the last 20 years from around 40% of total health expenditures (THE) in 1987 to almost 57% in 2006 (ΕΣΥΕ, 2007), which is the highest share among the EU-15 (OECD Health Data, 2008). The greatest bulk of private health expenditures, and their increase, is attributable to OOP payments, as still less than 8% of the population is covered by private health insurance. Within the EU, Greeks express the greatest degree of dissatisfaction with their National Health System (NHS) and public health services (Eurobarometer, 2007). The Greek NHS is characterized by severe bureaucratic constraints, and great deficiencies of specialized personnel and advanced diagnostic equipment - especially in rural areas (Τούντας, 2008). The weakness of the public system has encouraged the use of private health care providers. But OOP payments for health care are not only made in the private sector. Consumption of pharmaceuticals is very high in Greece (OECD, 2007;Juerges, 2007c). While pharmaceutical prices are relatively low and insurance coverage is quite extensive, the high volume of utilization and the extensive substitution of older drugs with new, patented and more expensive drug products

drive up OOP payments. Another contributing factor is the continuing problem of informal, illicit payments for care provided in the public sector (Liaropoulos et al., 2008; Siskou et al., 2008).

Financing health care from OOP payments leaves households exposed to considerable risk from unforeseen expenditures that can severely disrupt their living standards. Lack of insurance reduces the welfare of risk averse individuals and, in the extreme, it may also create or exacerbate poverty as household resources are diverted from necessities to pay for essential medical care (Wagstaff and van Doorslaer, 2003). Besides these direct effects on the welfare of households, there may also be considerable indirect, macroeconomic effects as households alter their consumption and saving plans in order to self-insure against medical expenditure risks (Jappelli, Pistaferri and Weber, 2007). Social protection and access to health care for all disadvantaged groups regardless of ability to pay are part of the common objectives adopted by the European Union to combat social exclusion. The hazard that OOP payments present to household living standards and the tackling of the *medical poverty trap* – that is impoverishment caused by paying for health care- are recognized as major policy issues in the financing of health care (Whitehead & Dahlgren, 2007; Dahlgren & Whitehead, 2007).

The high level of OOP payments for health care in Greece has been documented in previous studies, using data from the Household Budget Survey (Souliotis and Kyriopoulos, 2003; (Σουλιώτης, 2002); (Ματσαγγάνης, Τσακλόγλου, & Μητράκος, 2001); Liaropoulos, 1998). But detailed investigation of the burden of these expenditures on household welfare has not previously been made. Nor has attention

been given to how, and why, this burden differs from that experienced in other European countries. Bringing a comparative perspective to the issue is potentially useful both in highlighting the extent to which Greeks are underinsured with respect to medical expenditure risks relative to their European neighbors and in documenting institutional and policy deficiencies that may contribute to the problem.

This chapter documents the extent and distribution of the financial burden of OOP payments for health care relative to household income incurred by older Greeks and compares this with catastrophic medical payments incurred in other EU countries. The comparative dimension of the analysis is facilitated by the Survey of Health, Aging and Retirement in Europe (SHARE), which provides closely comparable data on health care payments and income for the 50+ populations of eleven European countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden and Switzerland). Most previous comparative studies of health care payments have relied on numerous national sources, whose different design and content impede comparisons. The harmonization of variable definitions and methods in SHARE facilitates the comparison of OOP payments for inpatient care, outpatient care and medicines. The ability to distinguish consistently between types of health care is of great importance for drawing policy implications as co-payments mechanisms differ across them.

The burden of health payments incurred by the older population is of particular interest given that health care needs are concentrated in this age group. Although research has shown that older people make heavier use of healthcare services, most studies that assess the magnitude and distribution of OOP payments in elderly populations refer to the U.S. given the previous lack of consistent European data. In the context of a rapidly ageing population, the health expenditures faced by

the elderly and their means of preparing for them is one of the most pressing issues in public policy throughout Europe. Monitoring the distributional effects of OOP payments in the elderly EU populations is of great importance as demographic ageing threatens to strain social solidarity and the capacity of the health systems to ensure accessibility to high quality care. Cross-country comparison is also of particular interest in this age range since reimbursement policies and policies for exempting the old from user charges differ.

The structure of the chapter is as follows. The next section provides background information on the magnitude and structure of OOP payments and cost-sharing policies in Greece and in each of the other ten European countries with which the burden of OOP payments will be compared. In the third section, estimates of the magnitude and distribution of OOP payments relative to household income are presented. In the fourth section, a definition of catastrophic OOP payments is introduced and estimates made of these in Greece and the comparison countries. Finally, we summarize the main findings and the lessons that can be drawn from these for health policy in Greece.

4.2 Paying for Health Care in Greece and Other SHARE Countries

In Greece, health services are funded almost equally through public and private sources. In 2004, expenditures on health amounted to around 10% of GDP, with public spending accounting for only 47% of these expenditures - the lowest share found in any of the SHARE countries. Hence, the Greek health care system one of the most "privatized" in the European Union. Public expenditures are financed by both taxes, which amount to around 44% of public health expenditures (PHE), and compulsory health insurance contributions by employees, the self-employed and employers. The vast majority of the population (97%) is covered by approximately 35 different social insurance funds. Private health insurance plays only a minor role, with less than 8% of the population purchasing complementary voluntary health insurance that accounts for only 4.3% of private health expenditures (ICAP, 2007; WHO, 2006). So, the greatest bulk of private health expenditures is financed through uninsured, out of pocket payments by patients.

Out-of-pocket payments take three broad forms: 1) *direct payments* - payments for treatments that are not covered by any form of pre-payment or insurance; 2) *cost-sharing* - an arrangement that is commonly applied in European health care systems and requires that the insured individual pays part of the cost of health care received; and, 3) *informal payments* - unofficial payments for treatment that should be fully funded from pooled revenue[25]. Cost-sharing includes copayments

[25] OOP payments also refer to informal payments made in the public sector which are not officially endorsed. These payments are covert and much of the 'evidence' in western European countries is anecdotal. However, two recent studies document that these payments are widespread in Greece (Liaropoulos, et al., 2008; Siskou et al., 2008).

(a flat fee or charge per services), co-insurance (a percentage of the total charge), deductibles (a payment covering the first x amount before insurance coverage begins) and balance billing (an additional fee the provider levies in addition to the payment received from the third-party payer).

A comparison of this financing mix with those of the other SHARE countries shows that Greece holds a unique position regarding the level of OOP expenditures. The SHARE countries can be broadly divided into the ones that have adopted a Beveridge system of a National Health Service (NHS) primarily financed out of general taxation (Sweden, Denmark, Spain and Italy)[26] and those that have a Bismark system of social health insurance (SHI) predominantly financed through employee and employer contributions (Germany, the Netherlands, France, and Belgium). Switzerland stands alone with a health care system characterized by private mandatory insurance. The Greek health care system does not fall neatly into this taxonomy. There is a National Health System but, in principle, financing is organized on a social insurance model. However, the financial autonomy of the social insurance funds with respect to the central government budget is not clearly defined. As a result, a large share of revenue is financed from general taxes.

Private spending as percentage of total health expenditures varies substantially between the rest of the SHARE countries from around 42% in Switzerland to 15% in Sweden and Denmark. But not even Switzerland does the private share of spending reach the 53% seen in Greece (OECD Health Data, 2008 for the year 2004). As can be seen in Table 4.1, in the majority of the countries (with the exception of the

[26] Italy is classified in the ECuity Project as having roughly equal parts of tax financing and social insurance while in most recent studies (Ghislandi et al 2005; EuroObserver 2003;) Italy is classified as a tax-based system.

Netherlands and France) OOP payments account for the majority of private expenditures. Greece holds an extreme position as the OOP contribution reaches almost 51% of total health expenditure (THE). The OOP contribution is also high in Switzerland (31.5% of THE). In Belgium, with a health system mainly financed through social health insurance, OOP contribution accounts for 24% of THE, while in Italy and Spain the respective percentage exceeds 20% of THE. The very low share of OOP in relation to THE in France (around 7%) reflects the fact that around 85% of the population has some form of supplementary insurance to cover co-payments.

With the exceptions of France and Switzerland, the share of private expenditures in THE is increasing. Apart from the Netherlands, this increase has been due to increasing OOP payments (OECD Health Data, 2008; Wagstaff et al., 1999). The increase has been most marked in Greece, where between 1989 and 2004 private health expenditures as percentage of GDP increased by 1.2%, while public expenditures increased by less than 0.5% during the same period.

4.2.1 Why Are OOP Payments for Health Care So High in Greece?

There appear to be four main reasons that explain why OOP payments for health care are so high in Greece in comparison with other European countries. First, dissatisfaction with public health services is extremely high. The percentage of the population dissatisfied with the national health system[27] reaches almost 80% (Eurobarometer, 2004). Only Italy comes anywhere near such a rate of dissatisfaction (66%) and the average over all SHARE countries is less than 45%. The dissatisfaction of the Greek population mainly concerns the long waiting lists for visits to specialists and advanced medical technology departments of public hospitals, but also the poor

[27] Those that express the opinion that the health care system needs fundamental changes or complete rebuild.

quality of hotel facilities and cleanliness of public hospitals. Three-fifths of all hospital beds are concentrated in the greater area of Athens. Of the 13 regions in Greece only half of them have public general hospitals that offer the whole range of medical specialties. In addition, most of the public primary care centers in rural areas are understaffed and inadequately equipped to cover the health care needs of the population. As a consequence a sizeable private sector has been developed consisting of consultations with physicians in private practice, visits to private diagnostic centers, as well as private hospitals for in-patient care (Tountas et al, 2005). A 2006 study revealed that 12% of inpatient days took place in private hospitals (ICAP, 2006). However, the richest fifth of the population were as likely to use private as public hospitals. Among individuals over the age of 50, private hospitals account for 17% all inpatient stays, and the share rises to 23% in rural areas. One-quarter outpatient care is delivered by private doctors that are not contracted with social insurance funds. The cost of these visits is exclusively incurred by the patient. Among the fourth richest income decline almost 42% outpatient care is delivered by private doctors, while the share is still 23% among the fourth poorest decile.

The second reason for the high OOP payments for health care is that, while use of private health care is extensive, private insurance coverage is limited. Why private insurance has not developed more to protect against high direct payments remains somewhat of a puzzle. A few years ago, it might have been attributed to the immaturity of financial markets. But with the increasing availability of sophisticated financial products, this is now a less convincing explanation. A lower degree of risk aversion in the Greek population is also not convincing both because it is not obvious that this is the case and, if it were, one would still need to explain why this is so. One possible explanation is that doctors prefer to be paid directly by the patient rather than

through documented, auditable procedures required by insurance companies. This brings us to the third explanation for high OOP payments.

An important difference between Greece and the other SHARE countries is that a significant proportion of OOP expenditures in Greece takes the form of informal payments (Liaropoulos et al., 2008; Mossialos, Allin, & Davaki, 2005; Siskou et al., 2008). Although the provision of NHS outpatient and inpatient services is almost free of charge at the point of usage, many patients are either asked directly or feel obliged to pay additional fees as a so-called "present". This takes place despite the fact that all the professionals who work for the NHS are paid on a salary basis. Informal payments (which are basically illegal) are especially prominent in the case of in-patient care (especially for surgery) but also in the out -patient care sector. They are made in an effort to jump the queue or to secure a better quality of services and greater personal attention by doctors (Mossialos 2005). For obvious reasons, there are no precise estimates of the pervasiveness of informal payments and the size of the hidden economy in medicine, but it has been estimated that illegal payments account for over 20% of total private expenditure on health care (Liaropoulos et al., 2008).

The final factor explaining high OOP payments is the level of expenditures on pharmaceuticals. Although the prices of pharmaceuticals are among the lowest in Europe (estimated 30% lower than the OECD average) consumption is relatively high (OECD, 2007; Mölstad et al. 2002). In addition to high consumption in Greece there are no specific procedures in place regulating doctors' prescribing and encouraging the use of generic drugs. Generics constitute only 9.7% percent of the Greek pharmaceuticals market, which is small by international standards. Generic substitution is prohibited and pharmacists' profits are directly linked to the price of the product dispensed, providing a disincentive to issue cheaper medicines. It has

been claimed that since 2000 many pharmaceutical companies substitute older products with new, more expensive ones (Contiades et al., 2007). The absence of controlling mechanisms has contributed to the escalation of pharmaceutical expenditures. In 2004, pharmaceutical expenditures accounted for an extremely high 20% of total health expenditures, exceeded only by Spain (24.5%) among the SHARE countries. One-fifth of these extremely high expenditures on pharmaceuticals is covered by direct payments from patients (OECD Health Data, 2008; Κουσουλάκου & Βίτσου, 2008).

Table 4.1: Health Care Finance in the SHARE Countries

Country	Type	Public Expenditure			Private Expenditure		
		General taxation (%)	Social Insurance (%)	All public (%0	OOP (%)	PHI (%)	All private (%)
Austria	Social Ins.	30.5	44.9	75.4	17.5	7.1	24.6
Belgium *	Social Ins.	n.a	n.a	71.7	24.0	4.4	28.4
Denmark	Public Tax	82.9	0	82.9	15.8	1.2	17.0
France	Social Ins.	3.7	75.0	78.6	9.8	11.6	21.4
Germany	Social Ins.	10.1	69.1	79.2	11.4	8.5	20.8
Greece**	Public Tax	26.5	20.5	47.0	50.7	2.3	53.0
Italy	Public Tax	n.a	n.a	74.5	22.4	2.1	25.5
Netherlands	Social Ins.	3.9	58.6	62.5	10.1	17.1	37.5
Spain	Public Tax	66.0	5.3	71.3	23.7	4.1	28.7
Sweden	Public Tax	n.a	n.a	85.1%	n.a	n.a	14.9%
Switzerland	Pri. Ins. mandatory	17.9	40.0	57.9	31.5	9.6	42.1

Source: OECD Health Data 2008 for the year 2004. Data on Private Health Insurance (PHI) include both primary (principal or substitute) and voluntary PHI. *Source: Avalosse & Léonard, 2006; **Source: (ICAP, 2007) for the year 2004.

4.2.2 Cost-Sharing in Greece and Other SHARE Countries

Although obtaining data that are completely standardized across countries is difficult, Table 4.2 provides a broad indication of the cost-sharing arrangement found in each country for outpatient services (primary care, ambulatory care and specialist consultations), inpatient care and pharmaceuticals. As can be seen, cost-sharing is

extensive for pharmaceuticals. Different countries favor different approaches. Greece has adopted the approach of co-insurance. The general co-payment rate is set at 25% and is made directly by the patient to the pharmacist. Low-income pensioners entitled to cash benefits (EKAS) and their household members pay a reduced rate of 10% (which is also applied to medicines for certain chronic disease categories, e.g. Parkinson's disease, coronary disease, asthma and others). Those treated for industrial accidents, or suffering from life-threatening illnesses and certain chronic illnesses are totally exempt from co-payments. SHARE countries in favor of the approach of the co-insurance include Belgium, Denmark, France and Spain. A flat-rate per prescription is levied in Austria. A deductible (a fixed amount) per prescribed item is combined with co-insurance above the deductible in Germany. In Denmark, France, the Netherlands, Italy, and Germany reference pricing is used as an indirect form of cost sharing for certain categories of drugs.

In Greece there is no cost-sharing for inpatient care in the public sector. In the other countries cost sharing applied to inpatient care tend to be in form of a co-payment per day, while in France this co-payment is an adjunct to co-insurance. Sweden is the only member state that enforces a co-payment for visits to the accident and emergency departments of hospitals. In Greece, cost sharing for outpatient services in the public sector is applied in the form of a nominal fixed amount (3€) which refers to outpatient visits in public hospitals, while in the rest of the countries cost sharing to outpatient services (GP and ambulatory specialist care) most frequently takes the form of a co-payment or co-insurance with some extra billing for visits to doctors not contracted with the public sector (sickness funds).

In all countries under study cost sharing is implemented in conjunction with mechanisms to protect vulnerable groups of the population. Protection mechanisms

can take the form of exemptions, reduced rates or maximum OOP payments. Exemptions and co-payment reductions commonly relate to one or more the following: 1) certain medical conditions and disability groups, 2) income groups and pensioners; 3) age groups. Most of the countries apply a mixture of protection mechanisms. In Greece, there are no exemptions from copayments due to age but a reduced co-payment rate is applied to low income pensioners. In addition, the indigent, unemployed and those suffering from certain chronic or life-threatening conditions are fully covered against co-payments or pay a reduced co-payment rate (depending on the disease). Denmark is the only SHARE country that offers protection through reduced co-payments only. Germany, Sweden and Switzerland have some sort of cap on co-payments, that is they implement a cap on how much a patient pays on out of pocket health care expenditures (either in relation to household income or as a lump sum amount).

In summary, cost-sharing in Greece is not greater than in other countries and individuals are not expected to make larger contributions to the cost of health services provided in the public sector. A country very similar to Greece regarding cost-sharing is Italy, where co-payments are basically limited to ambulatory specialist services, while exemptions are relatively liberal (France et al, 2005). Cost-sharing is also modest in Netherlands, while Spain, where cost-sharing is relatively limited, is the only country to exempt all pensioners. This is of particular interest given the current analysis covers individuals aged above 50 years. The highest degree of cost-sharing is found in Belgium, where co-payments are high and protection mechanisms take the form of a global income-dependent annual ceiling on health payments.

Table 4.2: Cost Sharing for Health Care Services and Protection Mechanisms in the SHARE Countries

Country	Outpatient Sector	Inpatient	Pharmaceutical	Groups partially or totally exempt	Ceiling on co-payments
Austria	20% of service costs (no payments for 80% of the population)	€8 per day & 10% of care fees max 28 days annually)	Fixed Prescription fee	Certain clinical conditions, disabled, low-income pensioners & low income groups	None
Belgium	8% to 40% of fee (usually around 25%)	Fix per diem charges depending on the duration of stay	Co-insurance rate of 0%; 25%, 50% and 60% of cost depending on drug categories	Preferential reimbursement for particular social groups.	Maximum billing (MAF): OOP maximum, based on the family's net income, after which further health care costs are covered fully.
Denmark	None except for 2% copayment for those who visit specialists without GP referral)	None	Co-insurance ranges from 100% to 15% depending on the individual's annual OOP expenditures	Partial exemption for chronically & terminally ill and for those in low income and the elderly	None
France	Around 30%	Around 20% plus small co-payment for hotel expenses	Co-payment of 35%, 65% and 85% depending on the product	People with specific medical conditions and those with low income (<7,083€/year)	None. 85% of population has supplementary private insurance against co-payments.
Germany	None	Fixed amount per day up to a max of 14 days	Fixed fee per pack plus 100% of cost above the reference price	Chronically ill	Annual co-payments are limited to 2% of annual gross household income (1% for chronically. ill)
Greece	Fixed fee of €3 only for outpatients visit to public hospitals. None for NHS[28] services, balanced billing for private physicians	None	General copayment of 25%; reduced copayment (10%; 0% for specific categories of drugs)	Life-threatening and chronic diseases, unemployed. Low-income pensioners (10% for drugs).	None

[28] Doctors contracted with the National Health System

Country	Outpatient Sector	Inpatient	Pharmaceutical	Groups partially or totally exempt	Ceiling on co-payments
Italy	None for GPs[29]; deductible up to max of €36.2 for specialist visit	None	fixed amount per prescription and/or per pack (only in some regions; or payment (regional/ national levels) of the difference between the price of a more expensive and a cheaper product containing the same active substance	Exemptions relate to income, age and health status (e.g. permanent disability, rare diseases, certain chronic conditions	None
Netherlands	None for people insured with the statutory system (due to income below the defined ceiling)	A fixed co-payment per day	Difference between the reference and actual price (practically no copayment for all reimbursable drugs).	Some non-reimbursable drugs reimbursed for chronically ill patients	None
	Privately insured (31% of the population) usually have a deductible.[30]				
Spain	None (in the public sector)		General Co-insurance of 40%.	Pensioners, disabled, those in occupational accidents. Chronically ill pay 10% of the price of prescription drugs(with a ceiling of €3 per product)	None
Sweden	Copayment rates determined by municipalities	Fixed amount per day (SKr 80- per day)	Patients pay full price up to about €97, after which the subsidy increases gradually up to 100%.	Reduction only on inpatient charges for pensioners and low-income groups	Max. of €100/year of for outpatient care Max. of €200/year for prescription drugs
Switzerland	Payable deductible amount (around €180) and 10% co-insurance above the deductible amount		Same as for outpatient. But 20% co-insurance for branded drugs with generics available	No exemption for "social" reasons. No deductible for children.	Cost-sharing is capped annually (the deductible plus a max. fixed amount).

[29] General Practitioners

[30] As of 2006 the Health Insurance Act came to force and some a new insurance policies were introduced. As our analysis refers to the year 2004, these policies do not affect the results and are therefore not analysed in the current study.

4.3 Household Out-Of-Pocket Payments in Greece and the Other SHARE Countries

4.3.1 DATA

We use data from the first wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) collected in 2004. Israel is excluded due to incomplete data at the time of the analysis. The sample includes a total number of approximately 28,517 individuals over the age of 50 years (and their spouses) in 19,565 households. SHARE collected comprehensive information on the use of health care services, voluntary health insurance coverage and out-of-pocket expenditures for health care.

The analysis is of OOP payments for health care not including health insurance premiums and net of any reimbursement from insurance. Payments are recorded on an annual basis separately for inpatient care, outpatient care, prescribed drugs and also for care in nursing homes, day-care and for all home care services (the last three asked in one single question). Non-response rates for the out-of-pocket variables were very low (<0.01%).

The burden of OOP payments is assessed by examining them relative to ability to pay (ATP) (O'Donnell et al., 2008; O'Donnell, van Doorslaer, Wagstaff, & Lindelow, 2008; Wagstaff, van Doorslaer, & Watanabe, 2003; Wagstaff et al., 1999), here measured by gross household annual income. The later was derived from a total of seven sources (i.e. employment and self-employment earnings, pensions, private regular transfers, payments received from long-term care insurance, capital assets like bank accounts, bonds, stocks or share and mutual funds, and rent payments received). Hence, the income measure is suitable for both working and retired people. The unit of analysis is the household, as the household is typically the income-sharing unit and

for that reason is arguably the most appropriate for assessing how health care payments relate to ability to pay. Income and out-of-pocket expenditures are aggregated to the household level. Income adjustments for the size and composition of the household to take account of economies of scale and differential consumption needs were made using the "OECD-modified equivalence scale"[31].

All of the variables are reported in the survey. Survey data may be subject to both recall bias and small sample bias; mainly due to the infrequency that some health care payments are made (O'Donnell, van Doorslaer, Wagstaff et al., 2008; van Doorslaer et al., 2007). The referral period of one year might reduce bias through infrequency of payments at the expense of increasing recall bias. As noted by Deaton (Deaton, 2005) there are also inconsistencies between estimates of total private expenditure obtained from surveys and those obtained from national accounts. However, due to the difficulty to control for these factors in the survey, the analysis is based on the assumption that the reporting of out of pocket health care expenditures is not systematically related to ATP and thus the survey data provide unbiased estimates of the OOP budget share and its distribution.

4.3.2 Incidence and Composition of OOPs

In our sample around 72% of the households reported to have paid OOP for at least one health care service. However, this proportion varies substantially across countries. In Greece, it reaches 87% (Figure 4-I). High proportions (> 85%) are observed are Germany, Sweden and Denmark, with Belgium having the highest

[31] The scale assigns a value of 1 to the household head, of 0.5 to each additional adult member and of 0.3 to each child.

proportion of households facing positive OOP's (around 95%). In the Netherlands, in Spain and in France the proportion of households facing positive OOPs is less than 50%.

Figure 4-I: Incidence of positive Out-of-Pocket payments in the SHARE countries (at household level)

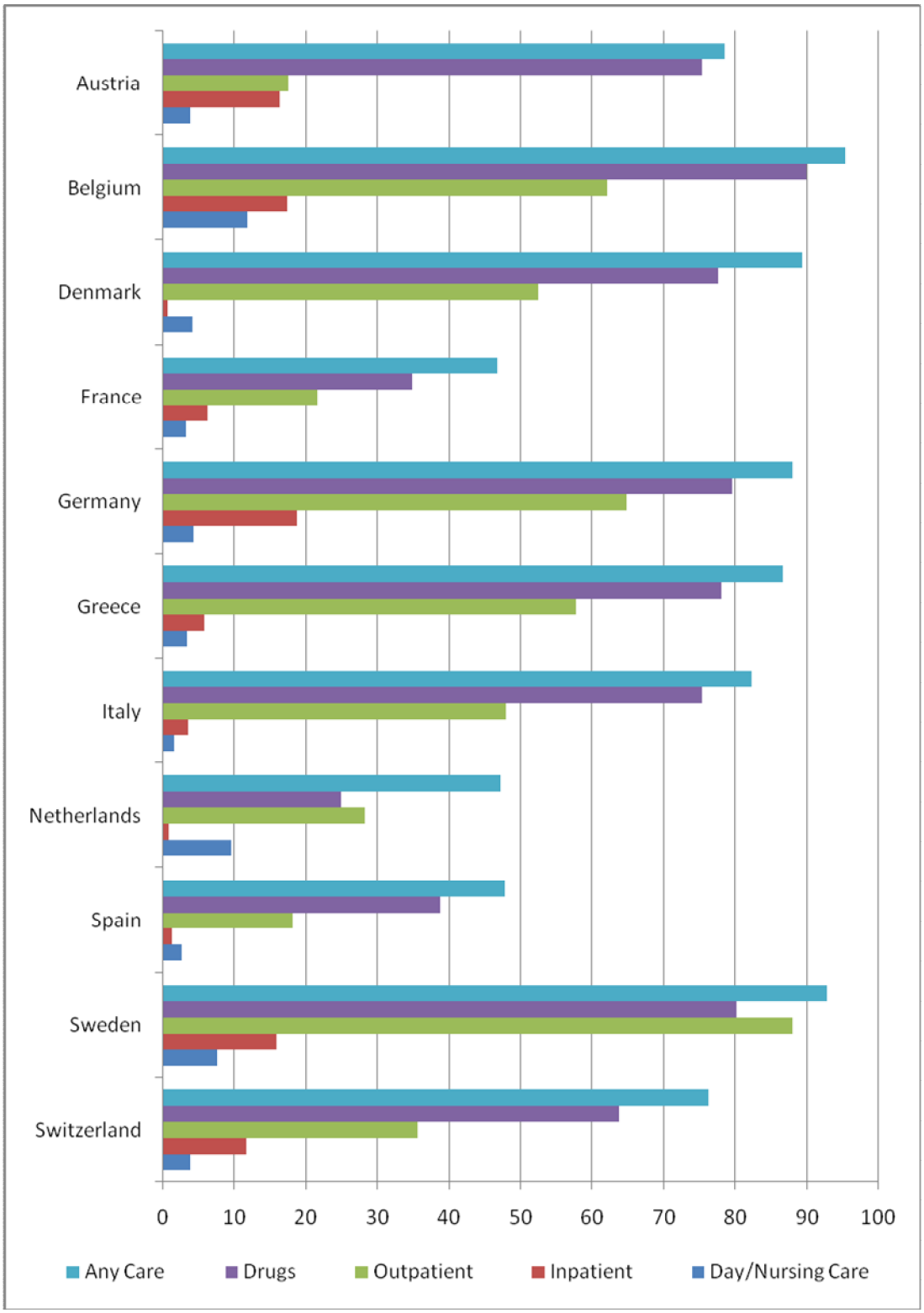


Table 4.3: Incidence and Composition of Out-Of-Pocket Payments in the SHARE Countries (at the Household Level)

	Percentage of households with OOP>0					Share of total OOP payments on:			
	any	inpatient	outpatient	medicines	Day-care/ nursing home/ home-based care	inpatient	outpatient	medicines	Day-care/ nursing home/ home-based care
Austria	78.5	16.4	17.5	75.4	3.8	8.0	11.4	77.3	3.3
Belgium	95.3	17.4	62.1	89.9	11.8	6.8	28.1	59.2	5.9
Denmark	89.3	0.7	52.5	77.6	4.1	0.4	35.8	60.9	2.9
France	46.7	6.2	21.6	34.9	3.2	8.3	32.8	54.1	4.8
Germany	88.0	18.9	64.8	79.6	4.3	8.7	32.9	55.2	3.2
Greece	86.6	5.8	57.8	78.0	3.4	3.7	39.1	55.2	2.0
Italy	82.2	3.6	48.0	75.4	1.6	2.2	37.3	59.4	1.1
Netherlands	47.2	0.9	28.3	24.9	9.6	1.0	49.5	32.6	16.9
Spain	47.8	1.3	18.1	38.7	2.7	1.8	26.9	66.5	4.8
Sweden	92.9	15.9	87.9	80.2	7.7	3.0	49.4	42.4	5.2
Switzerland	76.2	11.8	35.6	63.8	3.9	8.9	33.8	54.9	2.4

The nature of the data facilitates comparisons of the shares of OOP payments for inpatient care, outpatient care, prescription medicines and day care. In line with the health care policies described previously and the co-payment arrangements levied upon health care users (see Table 4.2), the proportion of the households incurring OOP payments for inpatient care in Greece is less than 4%. Equally small shares of OOPs disbursed for inpatient care can be found in countries where cost-sharing is absent for these services. In countries where co-sharing for inpatient care applies (Austria, Germany, Sweden, Switzerland and Belgium), the proportion of households incurring positive OOP payments for inpatient care is relatively higher but still below 20%. Inpatient care and day care absorb the smallest share of OOP payments in all countries (see Table 4.3)

On the contrary, in most countries drugs represent more than 50% of total amount spent on OOP payments. In Greece, almost 80% of households incur positive OOP payments for medicines and these represent around 55% of the total amount spent out of pocket. The percentage of the households that incurs OOP payments for prescription drugs is very high in almost all countries, with the exception of the Netherlands, Spain and France where it amounts to 25%, 39% and 35% respectively. Except in the Netherlands and Sweden, prescription drugs represent more than 50% of the total OOP payments, and the share reaches 78% in Austria). This reflects the tendency in all countries to impose some sort of cost-sharing for medications. Payments for drugs are much lower in Spain because of the exemption of all pensioners. In France, the extensive supplementary insurance against cost-sharing reduced OOP payments for drugs. In the Netherlands consumers only have to pay when the price exceeds the reference, with the results that the majority of the prescriptions issued are fully reimbursed (van den Berg & Schreurs, 2007).

In Greece almost 58% of the households incur OOP payments for outpatient care, a comparatively high proportion exceeded only in Sweden, Germany and Belgium. It is striking that although cost-sharing for outpatient services in the public sector in Greece is minimal, payments for outpatient care account for almost 40% of total payments, indicating the extent of use of private sector care and/or informal payments in the public sector.

4.3.3 OOP Payments Relative to Household Income

To give a first impression of the burden of OOP payments on household living standards we examine, in Table 4.4, their magnitude relative to household income. There is considerable variation across countries in the mean ratio of OOP payments to household income (see Table 4.4). Greece is at the upper extreme, with OOP payments for all health care services absorbing 7.4% of equivalent household income. Thus, the heavy reliance on OOP payments to finance health care in Greece, which was evidence in the aggregate statistics above, translates into a heavy impact on household finances and this occurs despite the relatively modest cost-sharing policies in the National Health System. Note that the burden of OOPs is also high in Italy, at 6.1% of income on average, another country with relatively limited cost-sharing for public health services.. Belgium stands in contrast to both Greece and Italy. While it also has a large burden of OOPs on the household budget, this is to be expected given the extensive cost-sharing for public health care, with no exemptions offered on the basis of income or age.

In Netherlands and France, the two countries that rely the least on OOP payments to finance health care, these payments absorb less than 2% of household income on average. Although Spain relies on OOP payments for around 24% of health financing, the low mean ratio of OOP payments to income most probably reflects the fact that co-payments mainly apply to prescription drugs and pensioners are totally exempt from them (in our sample 37% of the financial respondents of the households are pensioners, and another 8% are either unemployed or disabled). These policies appear to be rather effective in protecting elderly households' resources from the burden of OOP payments. On the other hand, although Switzerland relies heavily

on OOP financing (31.5% of THE), the relatively low average income share can be attributed to the higher levels of income in comparison to all the other SHARE countries but also to the fact that co-payments are annually capped (see Table 4.2).

Table 4.4: OOP Payments for Health Care as Percentage of Household Income

	Austria	Belgium	Denmark	France	Germany	Greece	Italy	Netherlands	Spain	Sweden	Switzerland
Mean	2.24	7.15	2.56	1.80	2.35	7.36	6.13	1.89	3.10	2.51	3.39
Coef. Of Variation (cv)	2.64	1.84	2.33	3.73	2.93	1.79	2.08	3.86	3.00	2.57	2.50
Median	0.52	2.22	0.91	0.0	0.62	2.70	1.62	0.0	0.00	1.00	0.60
Concentration index (CI)	-.3453	-.3512	-.4087	-.2964	-.4443	-.3077	-.3734	-0.3175	-.3944	-.4300	-.4711
Income Quintile Means											
Poorest 20%	5.16	14.48	5.15	3.89	5.83	13.84	14.36	3.45	7.16	5.76	7.06
2nd poorest	2.25	8.24	3.51	1.62	2.46	9.46	6.78	2.42	2.68	2.88	5.46
Middle	1.67	6.19	1.95	0.96	1.30	6.95	5.41	1.70	3.12	1.99	2.63
2nd richest	1.62	4.74	1.28	1.58	1.43	4.61	3.32	1.32	1.89	1.26	0.960
Richest 20%	0.78	3.34	0.98	1.07	0.89	3.09	2.18	0.66	1.19	0.71	0.92

Within each country, there is substantial variation in the ratio of OOPs to income across households, suggesting that OOP expenditures are highly unpredictable. In France and the Netherlands, the two countries with the smallest mean shares, the standard deviation of the share is around twice the mean. The distributions are all highly right-skewed with the mean twice the median or more in all countries. Employing the median as measure of central tendency reveals some interesting results. Greece is by a large amount the country with the highest OOP income share. This together with the limited variation and skewness in Greece (compared to the rest of the SHARE countries) could be attributed to the fact that more than 25% of the population aged 50 years and above turn to private doctors, which are not contracted with the social insurance funds for outpatients services (ICAP, 2006). The financing of outpatient private physicians is primarily conducted through direct out of pocket payments and to a lesser extend through private insurance (Τούντας, 2008).

The median estimates of the income shares in the Netherlands, France and Spain are zero, which reflects both the relative low reliance on OOP financing (France, the Netherlands) as well as the implementation of protection mechanisms for the elderly population (Spain).

The concentration index (CI) is presented as a summary measure of how OOP payments as a share of income vary across the income distribution (O'Donnell, van Doorslaer, Wagstaff et al., 2008). The index is restricted to the range (-1, 1). A positive (negative) value indicates that the rich (poor) devote a greater share of their income to paying for health care. Concentration indices of OOP income shares are negative in all countries, indicating that the better-off spend a smaller fraction of their income on out-of-pocket health care payments. This fact can also be observed in the

quintile specific mean of the OOP income share. The gradient is the less steep in Greece than in all countries other than France - OOP payments are less concentrated on the poor- which might be attributed to the fact that the poor are least able to opt out of the low quality public sector for better private health care services. In Belgium, Greece and Italy, the poorest fifth of the older population is estimated to spend on average around 14% of their household income on OOP, while the respective share in the other countries ranges from a minimum of 3.5% in the Netherlands to a maximum of 7.2% in Spain. There are also large differences at the other extreme of the income distribution. In Belgium, Greece and Italy the richest fifth of households spend more than 2% of their household income on OOPs, whereas in all other countries the ratio is around 1% or less. Overall, the table indicates that OOP payments are consistently a regressive form of finance, their proportionate burden is higher on lower income households. Given the scale of the reliance on OOP payments in Greece, this pushes the overall health care finance system toward regressivity.

4.4 Catastrophic Payments for Health Care

We have established that, on average, older Greeks spend almost 7.5% of their annual income on health care. This entails a considerable sacrifice of other consumption and a substantial impact on living standards. But there is also large variation around this average, such that some households see extremely large shares of their resources consumed by medical care needs. The disruption to household living standards and the sacrifices implied by such medical expenditures may prove disastrous and be regarded as catastrophic. The protection of people from such catastrophic payments and the elimination of the risk of becoming poor due to high medical expenses is widely accepted among the primary objectives of health care systems (Dahlgren & Whitehead, 2007; Whitehead & Dahlgren, 2007). Besides the

provision of social insurance, this is presumably the objective that motivates ceilings on the total amount of co-payments that are usually defined relative to incomes (De Graeve & van Ourti, 2003).

Although longitudinal data are much preferred to estimate the economic impact of health shocks and the extent to which households' living standards are compromised through the purchase of medical services (Wagstaff & van Doorslaer, 2003), cross section data are most often available and have been widely used in the literature (van Doorslaer et al., 2007; Xu et al., 2003). Out of pocket payments have been labeled 'catastrophic' when they exceed a certain fraction of household income or total expenditure in a given period of time, most frequently a year (O'Donnell, van Doorslaer, Wagstaff et al., 2008; van Doorslaer et al., 2007;Sun, Jackson, Carmichael, & Sleigh, 2008; Xu et al., 2003). Since there is no definitive threshold for OOP payments in relation to income that identifies catastrophic payments we use various thresholds ranging from 5% to 25%. The analysis follows the methodological approach of Wagstaff and van Doorslaer (2003) and O'Donnell et al (2008).

The incidence of catastrophic payments is estimated by the fraction of households incurring OOP payments in excess of the threshold share of income. Let T_i be OOP payments of household i, x_i be household income, z be the threshold income share and E_i be an indicator equal to 1 if $T_i/x_i>z$ and zero otherwise. Then, the incidence of catastrophic payments is given by the head count: $H = \frac{1}{N}\sum_{i=1}^{N} E_i$ where N is the sample size.

Apart from the headcount, what also is of importance is the extent to which the threshold is exceeded, which is given for a particular household by

$O_i = E_i((\frac{T_i}{x_i}) - z)$. The average overshoot over all household is then: $O = \frac{1}{N}\sum_{i=1}^{N} O_i$.

The mean positive overshoot (MPO) connects the two measures: MPO=O/H; and describes the magnitude by which out of pocket payments (as a proportion of income) exceed the specified threshold across all households exceeding the threshold.

The measures described above do not identify whether it is the poor or the rich who incur the catastrophic payments. To answer this question one should estimate how the proportions of those households exceeding the catastrophic thresholds vary across the income distribution. The distribution of catastrophic OOP payments in relation to income is estimated using the concentration indices of Ei (C_E) and O_i (C_o). A positive index indicates that the incidence (overshoot) is greater among the better-off. Based on the assumption that a greater weight is attached to catastrophic payments incurred by the poor, the weighted head count and overshoot are estimated. These take into account not only the incidence but also the distribution of catastrophic payments. The weighted head count (H^W) and overshoot (O^w) are computed as follows:

$$H^W = H(1 - C_E)$$

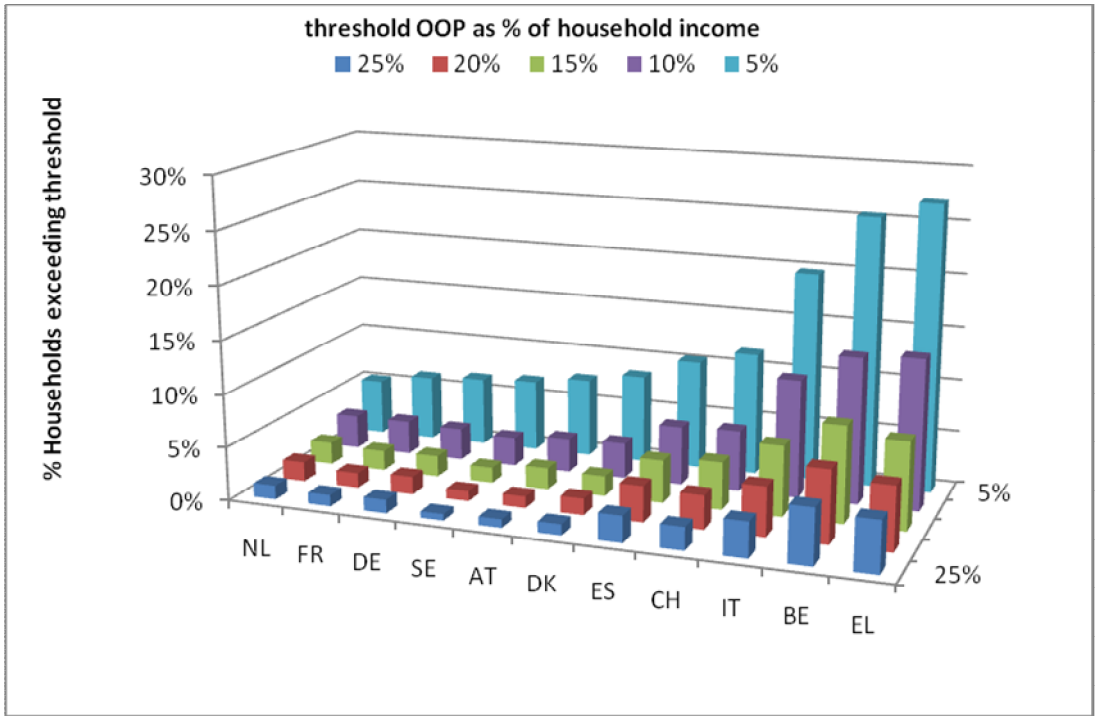
$$O^W = O(1 - C_O)$$

The most disadvantaged households receive a weight of two and the weight declines linearly with income rank so that the better off receive a weight of zero. So, if the poorest household incurs catastrophic payments it is counted twice in the calculation of H^W, while if the richest household incurs catastrophic payments it is

completely discounted. If catastrophic payments are concentrated more among the poorest members, the concentration index (C_E) will take negative values and H^W will be larger than H (and respectively for O^W and O).

In Figure 4-II (see also Table 4.5) we present the catastrophic payment headcount (Hc)- the percentage of households incurring catastrophic payments. The headcount by definition decreases as the threshold is increasing.

Figure 4-II: Percentage of households incurring catastrophic payments - various thresholds of OOP as % of household income



Greece stands out from all other countries with a tremendous 27% of all older Greek households spending more than 5% of their incomes on health care. The proportion of households with OOP expenditures in excess of 15% and 25% of income is still remarkably high at 8.2% and 6% respectively. Since there are little or no official co-payments for outpatient and inpatient care in the NHS, these very high burdens of health payments are attributable to co-payments for drugs, private care and informal payments in the public system[32]. The outstanding position of Greece in Europe regarding catastrophic OOP expenditures was also documented in the study conducted by Xu et al (2003). While the results are not directly comparable due to differences in data and methods[33], Xu et al found that the proportion of Greek households incurring catastrophic payments was exceeded only by the Portuguese and was more than five times greater than that found in any other EU country.

Following Greece catastrophic payments are most prevalent in Belgium and Italy, while France and the Netherlands are the two countries with the lowest prevalence of catastrophic payments. France has a higher proportion of households than Netherlands spending in excess of 5% of the household income but the positions are reversed at all higher threshold values. As noted in previous literature (Xu et al., 2003)(van Doorslaer et al., 2007) the incidence of catastrophic payments should be

[32] Unfortunately the survey does not provide reliable and comparable data on the care received from private providers - (are totally missing for three countries), however, a crude estimate is that in Greece 21% of the SHARE Greek population has received health care from private providers which is the highest percentage after Switzerland (27%).

[33] Xu et al (2003) used data from the Greek Household Expenditure Survey for the year 1998 which covers the general population as opposed to the over 50 population sampled in SHARE. Xu et al examined OOP payments relative to "nondiscretionary expenditure" defined as the income remaining after basic subsistence needs have been met. Payments were characterized as catastrophic if they exceeded 40% of nondiscretionary expenditure. In Greece, 2.5% of household incurred catastrophic payments using this definition compared with 2.7% in Portugal and 0.5% of less in the rest of the EU countries.

higher in countries with greater reliance on OOP financing of health care. Although this is true for Belgium, Greece and Italy, Spain is an exception, which presumably is due to the total exemption of pensioners from co-payments.

In our sample the results indicate that Belgium and Italy do not fall far behind Greece. De Graeve & van Ourti (2003) have estimated the incidence of catastrophic expenditures in Belgium using data from the Belgian Household Survey for the year 1997-1998. The results are not directly comparable due to the fact that their data refer to the general population, while our data refer to the elderly population aged above 50 years. In spite of the methodological differences, the comparison the estimates can provide a crude indication of the impact of the shift towards increased private financing on the households. In 1997, public financing amounted of 81.3% of total health expenditures while the respective share fell to 71.7% in 2003. Out of pocket payments amounted for 15.3% in 1997 and increased remarkably to 24% in 2003. For the general population, De Graeve & van Ourti (2003) found that the OOP payments exceed the threshold of 5% as a proportion of gross household income in 12% of all households, while the incidence of households in the SHARE data that exceeded this threshold was 25.5%. This enormous increase in the households incurring catastrophic expenditures suggest that health care policies adopted for the tackling of catastrophic OOP expenditures have not been adequately protective for a large group of the elderly population and more needs to be done towards this direction.

The distribution of catastrophic payments is indicated by the concentration indexes which are negative in all countries, implying that catastrophic payment are more concentrated among the poorest households. Because all the concentration indexes are negative, the rank-weighted headcounts tend to be higher than the headcount measures. The difference between the weighted and unweighted indices is

less in France and the Netherlands, indicating more even distributions of catastrophic payments, and more marked in Germany, Denmark, Sweden and Switzerland. In Greece the weighted headcount at the 5% threshold is remarkably 35% and differs from the unweighted headcount by almost 9 percentage points. The magnitude of this difference indicates that it is predominantly the poor that incur catastrophic payments. Taking into account the distribution of catastrophic payments does not have an impact on the ranking of the countries. In all countries, the incidence of catastrophic OOP payments at higher threshold values is much more concentrated among. The poor are much more likely than the better-off to be spending in excess of 20% or 25% of their income on health care. This reflects the strong positive correlation between income and health and the lack of full protection of the poor against health expenditure risks.

Table 4.5: Percentage of Households Incurring Catastrophic Payments

		OOP payments as share of household income				
	Threshold	5%	10%	15%	20%	25%
AUSTRIA	HeadCount (Hc)	7.51%	3.18%	2.02%	1.08%	0.79%
	Concentration Index (C_E)	-0.422	-0.5216	-0.6505	-0.7381	-0.7714
	Rank weighted headcount (Hc^W)	15.68%	4.79%	3.16%	1.70%	1.21%
BELGIUM	HeadCount (Hc)	25.45%	13.74%	9.05%	6.77%	5.22%
	Concentration Index (C_E)	-0.2995	-0.3592	-0.3768	-0.4511	-0.4719
	Rank weighted headcount (Hc^W)	29.61%	14.99%	10.34%	10.34%	5.71%
DENMARK	HeadCount (Hc)	8.39%	3.34%	1.88%	1.54%	1.02%
	Concentration Index (C_E)	-0.4687	-0.6387	-0.7520	-0.7220	-0.8057
	Rank weighted headcount (Hc^W)	12.78%	5.62%	3.34%	2.75%	1.19%
FRANCE	HeadCount (Hc)	6.18%	3.21%	1.86%	1.39%	1.05%
	Concentration Index (C_E)	-0.2698	-0.3524	-0.3873	-0.4971	-0.5224
	Rank weighted headcount (Hc^W)	8.16%	4.47%	2.76%	1.99%	1.52%
GERMANY	HeadCount (Hc)	6.55%	3.02%	1.96%	1.66%	1.26%
	Concentration Index (C_E)	-0.4873	-0.5963	-0.6784	-0.7826	-0.8069
	Rank weighted headcount (Hc^W)	10.34%	5.31%	3.49%	2.99%	2.36%
GREECE	HeadCount (Hc)	27.01%	14.16%	8.18%	5.98%	4.82%
	Concentration Index (C_E)	-0.3232	-0.3526	-0.4075	-0.4229	-0.4833
	Rank weighted headcount (Hc^W)	35.74%	19.18%	11.77%	8.72%	7.18%
ITALY	HeadCount (Hc)	19.74%	11.12%	6.58%	4.60%	3.319%
	Concentration Index (C_E)	-0.3641	-0.4537	-0.4967	-0.5830	-0.6563
	Rank weighted headcount (Hc^W)	27.75%	16.06%	9.31%	7.02%	5.15%
NETHERLANDS	HeadCount (Hc)	5.30%	3.22%	2.08%	1.82%	1.30%
	Concentration Index (C_E)	-0.3520	-0.3755	-0.4266	-0.4753	-0.5465
	Rank weighted headcount (Hc^W)	7.81%	4.80%	3.25%	2.99%	2.24%
SPAIN	HeadCount (Hc)	10.36%	5.53%	4.00%	3.35%	2.47%
	Concentration Index (C_E)	-0.3773	-0.4604	-0.5440	-0.5103	-0.5954
	Rank weighted headcount (Hc^W)	14.05%	8.38%	6.37%	5.01%	3.88%
SPAIN	HeadCount (Hc)	6.84%	2.71%	1.45%	0.93%	0.60%
	Concentration Index (C_E)	-0.4542	-0.5930	-0.6238	-0.6724	-0.6124
	Rank weighted headcount (Hc^W)	10.94%	5.24%	2.55%	1.73%	1.23%
SWITZERLAND	HeadCount (Hc)	11.62%	5.73%	4.44%	3.15%	2.15%
	Concentration Index (C_E)	-0.4563	-0.5795	-0.6352	-0.6120	-0.6590
	Rank weighted headcount (Hc^W)	16.60%	9.14%	7.31%	5.23%	3.78%

Table 4.6 presents the overshoot statistics, which indicate the intensity of catastrophic payments. As the majority of the households do not incur catastrophic payments, the mean overshoot (O) largely reflects the incidence. Greece, Belgium and Italy have the highest mean positive overshoot implying a high intensity of catastrophic payments. At the 20% catastrophic threshold, Greece has a very high mean positive overshoot, indicating that among households spending more that 20% of household income on OOP payments the average OOP share exceeds this threshold by 20 percentage points, giving an astonishing 40% OOP income share. In Belgium and Italy, the average income share of those exceeding the 20% threshold is similarly high (39%). Although in Sweden and in Denmark the average income share for those exceeding the 20% threshold is very high as well (45% and 42% respectively), in these countries the proportion of households exceeding this threshold is very small

(0.9% in Sweden and 1.7% in Denmark) while the equivalent proportions are much higher in Greece (6%), Belgium (6.8%) and Italy (6.6%).

Table 4.6: OOP Payments in Excess of Catastrophic Payments Threshold Income Share

		OOP payments as share of household income				
	Threshold	5%	10%	15%	20%	25%
SE	Mean overshot (	0.57%	0.35%	0.25%	0.19%	0.15%
	Concentration Index (C_O)	-0.5910	-0.6273	-.6376	-.6384	-0.6308
	Rank weighted overshoot (O^W)	1.11.%	0.72%	0.53%	0.42%	0.34%
	Mean positive Overshoot	9.29%	13.50%	20.90%	25.22%	27.88%
DK	Mean overshot (	0.73%	0.48%	0.36%	0.27%	0.21%
	Concentration Index (C_O	-0.7027	-0.7678	-0.7904	-0.8057	-0.8122
	Rank weighted overshoot (O^W)	1.30%	0.89%	0.67%	0.52%	0.40%
	MPO	8.76%	14.60%	19.66%	17.985	20.30%
DE	Mean overshot (	0.07%	0.05%	0.04%	0.03%	0.02%
	Concentration Index (C_O	-0.7135	-0.7778	-0.8186	-0.8419	-0.8478
	Rank weighted overshoot (O^W)	1.40%	1.05%	0.08%	0.06%	0.05%
	MPO	11.7%	17.73%	22.33%	22.19%	22.84%
NL	Mean overshot (	0.75%	0.54%	0.42%	0.33%	0.025%
	Concentration Index (C_O	-0.4905	-0.5292	-0.5593	-0.5894	-0.6049
	Rank weighted overshoot (O^W)	1.24%	0.94%	0.76%	0.60%	0.48%
	MPO	14.45%	17.71%	21.38%	18.68%	20.59%
BE	Mean overshot (	3.30%	2.37%	1.82%	1.43%	1.14%
	Concentration Index (C_O	-0.4208	-.4582	-0.4879	-0.5093	-0.5210
	Rank weighted overshoot (O^W)	4.69%	3.45%	2.71%	2.16%	1.73%
	MPO	11.42%	16.24%	17.7%	18.85%	20.13%
FR	Mean overshot (	0.66%	0.44%	0.31%	0.23%	0.17%
	Concentration Index (C_O	-0.4280	-0.4733	-0.5294	-0.5770	-0.5904
	Rank weighted overshoot (O^W)	0.96%	0.65%	0.47%	0.35%	0.26%

	MPO	10.47%	13.46%	15.76%	16.92%	16.73%
CH	Mean overshot (	1.13%	0.95%	0.69%	0.50%	0.35%
	Concentration Index (C_O	-0.6106	-0.6526	-0.6727	-0.6923	-0.7217
	Rank weighted overshoot (O^W)	2.21%	1.57%	1.16%	0.84%	0.61%
	MPO	12.50%	17.45%	16.84%	16.97%	17.77%
AT	Mean overshot (	0.64%	0.39%	0.26%	0.18%	0.14%
	Concentration Index (C_O	-0.6292	-0.7593	-0.8582	0.9117	-0.9585
	Rank weighted overshoot (O^W)	0.98%	0.62%	0.43%	0.31%	0.23%
	MPO	8.04%	11.26%	12.13%	16.68%	17.76%
IT	Mean overshot (	2.28%	1.57%	1.13%	0.86%	0.66%
	Concentration Index (C_O	-0.5227	-0.5751	-0.6167	-0.6416	-0.6494
	Rank weighted overshoot (O^W)	3.38%	2.37%	1.75%	1.35%	1.05%
	MPO	10.92%	13.63%	17.42%	18.59%	20.44%
ES	Mean overshot (	1.47%	1.09%	0.86%	0.68%	0.54%
	Concentration Index (C_O	-0.5457	-0.5918	-0.6185	-0.6426	-0.6621
	Rank weighted overshoot (O^W)	2.28%	1.73%	1.38%	1.10%	0.88%
	MPO	14.40%	19.02%	20.66%	20.24%	21.89%
GR	Mean overshot (	3.13%	2.15%	1.60%	1.24%	0.96%
	Concentration Index (C_O	-0.4241	-0.4655	-0.4995	-0.5243	-0.5489
	Rank weighted overshoot (O^W)	4.45%	3.15%	2.40%	1.89%	1.49%
	MPO	11.58%	15.16%	19.17%	20.32%	19.9%

4.5 Conclusions

This study has provided evidence on the magnitude, the distribution and the economic consequences of OOP payments for health care incurred by the older Greek population in comparison with those of other European countries. The analysis indicates that the burden of OOP payments is very high in Greece. Averaged across all older households, OOP payments absorb a greater share of household income (7.4%) than in any other European SHARE country, being fourfold that spent in France and the Netherlands. Only Belgium and Italy come close to experiencing relative OOP payments on this scale. Almost one third of the older Greek households spend more than 5% of their income on OOP payments, whereas the fraction is less than a tenth in the majority of countries with the noticeable exceptions of Belgium and Italy again. A remarkable 8% of older Greek households spend more than 15% of their income on health care and an incredible 5% spend as much as 25%.

While the magnitude of OOP payments and their economic burden in Belgium and Italy are comparable to those in Greece, Italy appears more similar with respect to the causes of burdensome OOP payments. In Belgium, high OOP payments are an intentional feature of the health care system. High co-payments are levied an all types of health care and few groups are exempt from them. In Italy, like Greece, official co-payments in the public sector are relatively modest. However, in both countries individuals consistently report low levels of satisfaction with the NHS performance while public services are characterized by inadequacies in advanced diagnostic medical equipment and long waiting lists, especially in specific regions. The public responds by making extensive use of private health care for which they are uninsured (France, Taroni, & Doratini, 2005; Mossialos et al., 2005). In addition, in Greece uncontrolled informal payments within the public sector are widespread. These payments reduce the effectiveness of official policy in providing social protection against risky health expenditures. They are also the most difficult payments to insure against in the private market.

The analysis indicates that OOP payments constitute a regressive source of funding in all countries. In Greece this must have a strong impact on the overall regressivity of health financing given that as much as half of the revenue comes from direct payments. However, the regressivity of OOP payments in Greece is not as strong as in other countries, suggesting that OOP payments are incurred by individuals opting out from the public health care services, and this option is not feasible for the economically least advantaged. Nonetheless, the poor still devote a larger share of their income to paying for health care.

It is notable that the incidence of catastrophic payments is low in countries, such as Germany, that has explicit policies to protect against this risk in the form of

income dependent maximum ceilings on co-payments. Belgium also has such a policy but also a much higher incidence of catastrophic payments due to the higher level of the ceiling and the greater use of co-payments. Spain has avoided a high incidence of catastrophic payments among its older population despite widespread use of co-payments due to the exemption of all pensioners and the disabled from these payments. France provides another interesting comparison. Co-payments are extensive in the public system, but there is near universal protection against these risks through a combination of exemption of vulnerable groups and supplementary private insurance cover. However, robust conclusions regarding the effectiveness of these policies would require an evaluative analysis, rather than the descriptive one presented here. Furthermore, one obviously cannot blindly propose characteristics found in other health care systems as solutions to deficiencies of the Greek system without taking into consideration the broader socio-economic context, organizational framework and historical development of that system. For example, the development of the private insurance market would most probably be of limited effectiveness in protecting against health expenditure risks when so many of these are made informally and would not be reimbursable.

There are some limitations to the study that merit discussion. First, cross section data do not allow estimating with accuracy the extent to which the living standards of households are changed as a result of a health shock. A second limitation is that the data do not identify the means of financing health care. For example, it does not reflect whether health care payments were financed through savings. Third the thresholds of catastrophic OOP payments used were rather arbitrary and one might think they were rather conservative, given the fact that for example Germany uses the 2% share of gross household income as the out of pocket maximum.

Despite these limitations, the analysis has revealed that the burden of OOP payments for health care is substantial for many older European households and it is particularly so for the Greek elderly. With 14% of older Greek households spending 10% or more of their income on health, it is clear that the effective level of health insurance is far from universal despite official cost-sharing policies in the public sector being relatively modest. There is a need to look beyond cost-sharing in the NHS to the indirect causes of the high burden of OOP payments. The poor quality of the services supplied in the public sector as well as the uncontrolled hidden economy in medicine should be priority items on the health policy agenda. The obstacles on both the demand and supply side to the development of the private health insurance market also need to be identified and removed.

CHAPTER 5: Why Are Some Europeans Spending More on Pharmaceuticals than Others?

5.1 Introduction

The previous chapter demonstrated that out-of-pocket (OOP) financing of health care leaves older individuals exposed to the risk of unforeseen medical expenditures in some European countries. The analysis revealed that the notion of catastrophic health payments is not an issue that only concerns developing countries, or more market-based health systems like that of the US. Responding to medical needs absorbs a large share of the household income especially in Greece but also in Belgium and Italy, where almost one third of the households spend more than 5% of their income on health care. On the other hand, elderly households are relatively protected against high OOP payments in the Netherlands, France and Spain, followed by Austria, Switzerland, Germany, Denmark and Sweden.

OOP payments for pharmaceuticals constitute the greatest proportion of total OOP payments for health care in 9 of the 11 countries that participate in the Study of Health, Aging and Retirement in Europe (SHARE). In fact, prescription drugs account for more than 50% of the total amount spent on OOP payments in all countries, with the exception of the Netherlands and Sweden. This reflects the trend in all countries to impose some sort of cost-sharing for medications. In this chapter, I will document and explain cross-country variation in out-of-pocket payments for prescriptions drugs. This is of interest at a time when policy makers in all European countries are struggling to control pharmaceutical expenditures, while maintaining equitable access to pharmaceuticals for the whole population. The purpose of the analysis is to

investigate the extent to which differences in OOP expenditures on pharmaceuticals reflect cross-country variation in health care systems, reimbursement mechanisms and cost-sharing policies.

Cross-country differences in pharmaceutical expenditures arising from policy choices will be confounded by differences in the demand for pharmaceuticals due to differences in the health care needs and socioeconomic characteristics of populations. I therefore make extensive control for differences in health status and socioeconomic characteristics. This makes it possible to identify the extent to which older Europeans with the same health conditions and socioeconomic circumstances are exposed to different risks of paying for medicines out-of-pocket.

Chapter 3 described differences across European countries in the extent to which individuals with diagnosed chronic conditions are exempt from charges for prescription medicines. To investigate whether these policy differences result in cross-country variation in the extent to which the onset of a chronic condition raises payments for medicines, the issue of whether the effect of a chronic condition on OOP payments varies across countries was examined and, if so, whether the pattern of variation is consistent with that expected from cost-sharing policies.

The previous chapter, consistent with previous studies (Wagstaff & van Doorslaer, 1992; De Graeve & van Ourti, 2003), documented the regressivity of OOPs as a source of financing health care. A positive income effect on pharmaceutical out-of-pocket payments could be attributed to a utilization effect, namely that the better-off, who can afford to spend more on drugs, use more pharmaceuticals. However, the analysis in chapter 3 found only a small positive income effect on utilization in the full sample, and there was no effect whatsoever

among individuals with a diagnosed health condition. In addition, there was no evidence of an income effect on utilization varying across countries. But even without any impact of income on the utilization of pharmaceuticals, there could still be an effect on payments for them if social protection mechanisms are in operation that shield the poor from user charges or if the chronically ill, who tend to be poorer, are either fully exempt or subject to reduced cost-sharing for pharmaceuticals. This is investigated by examining the extent to which there is cross-country variation in the association between income and payments that is related to social protection policies.

The ability to study international variation in OOP expenditures on medicines has hitherto been hampered by the lack of comparable data from different countries. SHARE is the first survey that provides comparable cross-country information about out-of-pocket payments. The present analysis, as in chapters 3 and 4, uses data from the first wave of the SHARE collected in 2004. One of the greatest advantages of these data, also mentioned in chapter 3, is that they provide detailed information on health. In order to take full advantage of the available health indicators, the analysis (like that in chapter 3 but unlike that in chapter 4) is conducted at the individual level. This makes it possible to investigate the extent to which older Europeans with the same health needs make different payments for medicines.

As is to be expected given the lack of suitable data until recently, there are few studies that investigate cross-country variation in pharmaceutical expenditures while controlling for health care needs at the individual level. There are a considerable number of national level studies that examine the impact of prescription charges on the utilization of prescription drugs and other health services, or on drug, or total health care, expenditures (Winkelmann, 2004; Van Vliet, 2001; Van de Voorde, van Doorslaer, & Schokkaert, 2001; van Doorslaer, 1984). Two studies have investigated

the determinants of out-of-pocket pharmaceutical expenditures; however, both were conducted at national level. Street et al. (1999) investigated the impact of exemptions from charges on the utilization of pharmaceuticals and household expenditures on them in Russia (Street, Jones, & Furuta, 1999). Costa-Font et al. (2007) examined the determinants of OOP pharmaceutical expenditures in Catalonia, and, in particular, the impact of cost sharing and self-medication. Two studies have examined OOP payments for health care using the SHARE data but neither has focused on payments for pharmaceuticals. (Peytremann-Bridevaux & Chevrou-Severac, 2008) describe OOP payments for individuals with symptoms of depression, while Paccagnella et al. (2008) attempt to identify the impact of voluntary health insurance on OOP.

The structure of the chapter is as follows. The next section provides background information on insurance coverage and reimbursement policies for pharmaceutical expenditures in the SHARE countries, with a focus on the protection offered to the poor, chronically ill and elderly populations. Section 3 presents the empirical methods for estimating the impact of covariates on both the probability of incurring OOP for prescription drugs and the level of OOP payments for medicines. Section 4 describes the data and the measures used in the analysis. Section 5 presents the results. The final section summarizes the main results and discusses their policy implications and some potential limitations.

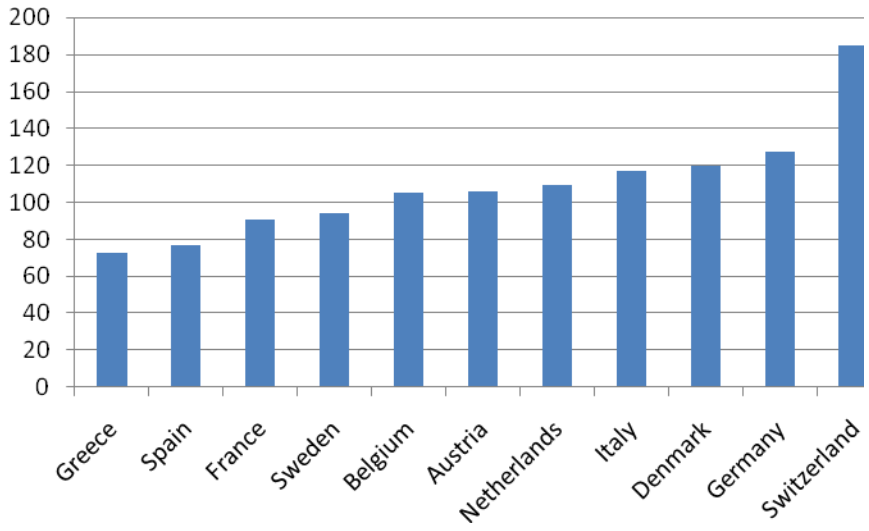
5.2 Pharmaceutical Reimbursement Policies

The broader aspects of the pharmaceutical sector in the SHARE countries has been described in detail in chapter 3. Here, the attention is restricted to the particular aspects that are expected to affect OOPs and may contribute to the variation of OOPs payments across the SHARE countries, focusing in particular on the reimbursement policies and the protection mechanisms.

Figure 5-I gives the average retail price (gross of reimbursement) of pharmaceuticals, expressed as a percentage of the EU-25 average (Konijn, 2007). Prices are highest in Switzerland, Germany, Denmark and Italy and lowest in Greece, Spain and France. As discussed in chapter 3, this price variation reflects the different regulatory systems adopted in the SHARE countries. For example, in Greece, fixed pricing using international comparisons is applied to all new products including over-the-counter (OTCs) medicines and determines the ex-factory price of pharmaceuticals The price of new pharmaceuticals is determined based on the average manufacturer price level calculated by considering the average of the three lowest prices among the EU-25 (two EU-15 countries plus Switzerland and one among the 10 new accession countries)(Vardica & Kontozamanis, 2007). In Spain, price regulation is the responsibility of the central state and the Ministry of Health also sets wholesalers' mark-up and determines retail mark-ups. On the contrary, in Germany, ex-factory prices for both inpatient and outpatient sectors are basically determined by manufacturers without negotiations involving governmental agencies, direct price controls or profit controls, However, price setting by companies takes into consideration policies such as indirect price regulations in the form of reference prices set by the sickness funds and legal minimum sales from parallel imports (Busse &

Riesberg, 2004). In Switzerland, prices of non-reimbursed OTC products and prescription drugs for which manufacturers do not seek (or do not obtain) reimbursement are freely set by the manufacturers while the maximum prices of drugs included in the benefit basket reimbursed by basic health insurance are negotiated with manufacturers. The Federal Office of Public Health however regulates both the inclusion in the positive list and sets maximum prices of all listed drugs (Paris & Docteur, 2007).

Figure 5-I: Average Retail Price of pharmaceuticals



Note: The price level of pharmaceuticals for each country indicates its price level compared to the EU-25 for the year 2005, which is produced by the Eurostat-OECD Purchasing Power Parity (PPP) programme

While price levels should, to an extent, be reflected in expenditures on pharmaceuticals, the price variation observed in Figure 5-I will not carry over directly to that in OOP payments for two reasons. First, one expects utilisation to respond to prices. Second, it is the net price after patient reimbursement, and not the gross price paid by the insurer, that is relevant to OOP payments for pharmaceuticals. In most European countries social insurance provides extensive coverage of pharmaceutical expenditures, but ageing populations and rising medical expenditures create pressures for many countries to increase patient cost-sharing. User charges are designed to discourage excess utilization of pharmaceuticals by creating price signals (Pauly, 1968) and are also a valuable source of revenue for insurers. However, user charges can threaten equity objectives by shifting the financial burden onto poor individuals, and by introducing barriers to access for those on low incomes (Gemmill, Thomson, & Mossialos, 2008).

All of the SHARE countries require some cost-sharing for prescription drugs (see table 3.3 in Chapter 3). As seen in Table 3.5 of chapter 3, on average, patients are expected to pay the highest share of cost in Denmark (40%). In Greece, Belgium, Austria and Sweden the equivalent rate varies from 14-22%. In Switzerland, patients pay on average around 10% of the cost of the reimbursed pharmaceuticals while in Germany and Spain around 7%. In Italy, France and the Netherlands the estimated cost paid by the patient is at a minimum – less than 3% (EFPIA, 2007; Office of Fair Trading, 2007).

Certain population groups- usually the elderly, chronically ill and the poor- are often protected from high out-of-pocket payments. Explicit protection mechanisms include reduced rates, exemptions from charges, discounts for paid-charges and annual caps on expenditure (out-of-pocket maximums). These special rates typically relate to one or more categories of individuals and are summarized in Table 5.1. In Austria low-income pensioners and people with certain infectious diseases are totally exempt from any prescription charges. In Belgium, on the other hand, total exemptions are not applied. There are, however, lower rates for those with income below a specified threshold and an annual ceiling of OOP payments. Preferential reimbursements also apply to those who receive disability benefits and certain drugs for some chronic diseases are fully reimbursed. In Denmark, chronically ill patients with a high use of drugs can apply on an individual basis for full reimbursement of any drug expenditure above an annual ceiling while people with very low incomes can also apply for financial assistance again on an individual basis (Vrangbaek, 2008). In France, as in Austria, people with certain chronic conditions and those with low income are totally exempt from cost-sharing for healthcare. In Germany, cost-sharing is capped at an annual maximum of 2% of household income (or 1% for the

chronically ill). In Greece, total exemptions and reduced co-payment rates co-exist. There is no cost sharing for drugs for specific chronic life-threatening conditions, while reduced co-payments apply to drugs for some chronic diseases and for low-income pensioners. In Italy, specific types of exemptions are applied for the chronically ill, people with rare diseases and disabled people. Only some regions use criteria for exemption based on income and/or age. In addition, all out-of-pocket payments above a certain annual amount (around €129) are eligible for a tax credit (equal to 29% of the value of out-of-pocket spending) (Donatini et al., 2008). In the Netherlands, co-payments are close to zero for reimbursable prescription drugs, as patients are only required to pay the difference between the reference and the actual price. However, OTC medicines are generally not reimbursed. Only those products which are intended for chronic treatment (registered for a chronic indication) are reimbursed. In order for such an OTC product to be reimbursed, the prescriber has to make clear that the prescription is intended for chronic use. On top of that, some non-reimbursable drugs are being reimbursed for the chronically ill (Klazinga, 2008). In Spain, all people aged 65+, irrespective of their income or their health condition, and those with permanent disabilities and are fully exempt from prescription charges. For a number of drugs for chronic diseases a reduced copayment rate applies (10% instated of the 40% general rate) (Duran, Lara, & van Waveren, 2006). In Sweden and in Switzerland, cost-sharing is capped at an annual amount, however there are no exemptions on "social reasons". In Sweden, this amount differs between health services, with a maximum amount of around €100/year for outpatient care and of €200 for prescription drugs[34].

[34] In Sweden cost-sharing reductions apply only for inpatient charges on pensioners and low-income groups.

In summary, taking into account the prices of pharmaceuticals alone, without considering cost sharing and the protection mechanisms, patients would be expected to pay more for medicines in Switzerland, Germany, and Denmark, and less in Greece, Spain and France. Accounting for general reimbursement policies, the average person is expected to pay a lower amount in the Netherlands and in Italy (EFPIA, 2007; Office of Fair Trading, 2007). The elderly population is better protected against OOP payments in Spain. Low-income people, and in particular low-income pensioners, are fully protected in Austria, France and Italy, and are protected to a lesser degree in Greece, Belgium and Denmark where they are subject to reduced cost sharing or "preferential reimbursement". Those with chronic conditions are fully protected against the burden of pharmaceutical OOP payments in France, Italy and Spain, and receive partial exemption in Greece and Belgium, and to a lesser degree in Germany. Sweden, Switzerland and Denmark implement consumption-based reimbursement. Although, there are upper limits on patients' annual pharmaceutical expenditures in the first two countries, in Denmark this ceiling is available only to those on low incomes and the chronically ill. Furthermore, although implicit, the substitution of generic for brand name drugs by doctors and/ or pharmacists could also be classified as protection mechanism (Thomson, Foubister, & Mossialos, 2008).

Table 5.1: Social Protection from Pharmaceutical Cost Sharing in SHARE Countries

Explicit Protection of groups defined by:				**Implicit Protection Mechanism**
Clinical conditions	**Low income**	**Elderly**	**Type of drug**	**Substitution of generic for brand drugs**
Denmark France Germany Italy Spain	Austria Belgium Denmark France Germany Greece Italy	Spain	Austria[I] Belgium[II] Greece[II] Italy[III] Spain Netherlands[IV]	Denmark France Germany Italy Netherlands Spain Sweden Switzerland

Source: EUGLOREH 2007 (EUGLOREH 2007, 2008)**; I-**Infectious diseases; II-treatments for chronic conditions and serious diseases; III-essential medicines, IV- only for certain OTC products that are intended for chronic use

5.3 Methods

The individual is the unit of analysis and out of pocket payments for medicines during the last year is the dependent variable. As is well-known in the literature, this variable has a right-skewed distribution with a large proportion of observations having zero expenditure. The appropriate method of modeling such a distribution has been discussed extensively in the health econometrics literature (Duan et al, 1983 & 1984; Hay & Olsen, 1984; Manning et al., 1987; Mullahy, 1998; Manning & Mullahy, 2001). In the current analysis in the full sample around 44% of the individuals incur

zero out-of-pocket expenditure for pharmaceuticals. However, this proportion varies significantly across countries from a high 81.2% in the Netherlands and 72.7% in France to a lower 17.8% in Belgium (see Table 5.2). Here, the analysis adopts the two-part model (TPM), which estimates the probability of having OOP payments for pharmaceuticals by probit and then estimates the level of positive expenditures by ordinary least squares (OLS) (Duan, Manning, Morris, & Newhouse, 1984). Applying the OLS to only part of the sample raises the possibility of sample selection bias, an issue that has triggered a heavy debate in the health economics literature (Jones, 2000). Consistency of the two-part model for the model parameters is based on strong assumptions. However, it is generally argued that the if the aim of the analysis is to simply predict conditional means and not to make inferences about individual parameters, then the two-part model performs reasonably well (Duan, Manning, Morris, & Newhouse, 1983). As argued by Dow & Norton (2003), the choice between a sample selection and a two-part model resolves around whether one wishes to model potential or actual outcomes. The vast majority of health expenditures analyses are in fact concerned with the determinants of *actual* expenditures, while the selection problem is relevant to research questions about the determinants of potential health expenditures. For inferences about actual expenditures the two-part model can be considered a superior estimator (Dow & Norton, 2003) and it avoids the difficult problem of identification of the sample selection model.

Let y_i denote observed out-of-pocket expenditures for drugs. Assuming the error in the first part of the model is normally distributed, then the probability that expenditures are positive is estimated by probit: $\Pr(y_i > 0) = \Phi(x_i\gamma)$, where Φ is the standard normal cumulative density function. In the second part of the model only positive expenditures are considered and the logarithmic transformation is applied to

the dependent variable in order to reduce skewness and diminish the influence of outliers. Further, the error is assumed independent of that in the first part of the model. Then $E\left[\ln y_i \,|\, y_i > 0, x_i\right] = x_i\beta$.

I estimate the marginal effects of covariates in each part of the model and also the full marginal effect combining both parts of the model on both the log scale and in euro. The latter marginal effect is taken from the derivative of the following expectation

$$E(y_i \mid x_i) = \Pr(y_i > 0) \times E(y_i \mid x_i, y_i > 0)$$

Note that this expectation is with respect to OOP payments in euro and not the logarithm of them. Computing the marginal effect on the scale of interest (euro) when the model is estimated with the dependent variable in logs requires accounting for both heteroscedasticity and the non-normality of the error term (Manning, 1998) ; (C. Ai & Norton, 2000). Using the White test, there was no evidence of heteroskedasticity in the continuous expenditure equation (p-value = 0.5830). It is therefore only necessary to allow for non-normality of the log-scale error term and a constant Duan smearing estimator is used when retransforming and calculating the marginal effects (Duan, 1983). The smearing factor is the average of the exponential of the residuals from the OLS regression on the log-transformed dependent variable

$$\hat{D} = \frac{1}{n}\sum_{i=1}^{n} \exp(\hat{\varepsilon}_i), \qquad where \qquad \hat{\varepsilon}_i = \ln y_i - x_i \hat{\beta}$$

Predicted pharmaceutical expenditures from both parts of the model are then

$$\hat{y}_i = \Phi(x_i \hat{\gamma}) \times \exp(x_i \hat{\beta}) \times \hat{D}$$

Bootstrap standard errors are computed for the marginal effects from each part of the model and for the full model on the log scale.

5.4 Data

As in chapters 3 and 4, data from first wave of the Survey of Health, Aging and Retirement in Europe (SHARE) carried out in 2004 are analyzed. The original sample covers almost 28,517 individuals in 11 European countries: Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden and Switzerland. Israel is excluded from due to incomplete data[35].

5.4.1 Out-Of-Pocket Expenditures

I analyze out-of-pocket payments for prescribed drugs net of any reimbursement from insurance. Payments are recorded for a period of one year. To increase comparability between countries all monetary values are expressed in Euros and are adjusted for purchasing power parities (PPP). For two countries—Denmark and Sweden—this involves transforming domestic currencies to the euro using PPP exchange rates. For the remainder of countries, PPP adjustment factors computed using OECD estimated price levels (OECD, 2004) are applied to take account of general price differences. All these variables are included in the original dataset (for further details see Borsch-Supan & Juerges, 2005).

Descriptive statistics regarding OOP payments are presented in Table 5.2. These differ from those given in the previous chapter because the analysis here is at the individual, as opposed to the household, level. In most countries it is estimated that more than 50% individuals over the age of 50 make some OOP payments for pharmaceuticals during the course of a year. The exceptions are the Netherlands

[35] For further details regarding the methodology of the Survey see Borsch-Supan & Juerges, 2005

(19%), France (27%) and Spain (35%). With the exception of the Netherlands and Sweden, prescription drugs represent more than 50% of total OOP payments for health care and this share reaches 80% in Austria. Mean spending on pharmaceuticals among those with any expenditures differs substantially across countries, ranging from €141 in Sweden to €417 in Belgium. Clearly there are striking differences across Europe in uninsured payments for pharmaceuticals. But these descriptive statistics take no account of differences across populations in the need for drug therapies and in their socioeconomic determinants. I now turn to the covariates used to control for such differences in the multivariate analysis.

Table 5.2: Out-of-Pocket Payments for Prescription Drugs in SHARE Countries (2004)

	Percentage of individuals with some OOP payments for pharmaceuticals (%)	Percentage of total OOP health care payments on pharmaceuticals (%)	Mean OOP payments for pharmaceuticals among those with any payment (€)
Austria	72.3	79.5	171.8
Belgium	82.2	59.4	417.1
Denmark	68.5	59.5	308.1
France	27.3	54.7	250.7
Germany	73.7	56.2	127.6
Greece	79.0	57.6	198.2
Italy	68.4	60.7	263.2
Netherlands	18.8	32.0	236.1
Spain	34.6	68.5	202.0
Sweden	73.4	42.2	141.3
Switzerland	56.6	56.8	273.1

Note: All values are in Euros PPP adjusted. Unit of analysis is the individual.

5.4.2 Control Variables

I distinguish between two categories of control variables expected to affect out-of-pocket expenditures: health care need factors and non-need or enabling factors. As argued in chapter 3, a major advantage of SHARE is that it contains "quasi-objective" indicators of health in the form of reported doctor-diagnosed chronic health

conditions (Maurer, 2007); (Juerges, 2007a)[36]. In addition, SHARE provides comparable data on a broad range of health indicators, including limitations with instrumental activities of daily living (IADL), mobility limitations, symptoms, body mass index (BMI), smoking status, cognitive functioning, an instrument for depression and self-assessed general health. This battery of health indicators allows identification of individuals across European countries with the same or similar needs for drug therapies and makes it possible to examine variation in out-of-pocket payments for medicines among these individuals. Variable definitions and sample means are given in Table 3. Regarding self-assessed health, respondents were asked to rate their general health as: very good, good, fair, bad or very bad. I collapsed the two lowest categories as the country samples have less that 2% of observations with responses in the category 'very bad', except for Spain where that proportion is 3.6%.

Non-need variables are again similar to those used in chapter 3 and include the highest level of education completed, i.e. tertiary (International Standard Classification of Education (ISCED) levels to 5 or 6), secondary (ISCED 3 or 4), with primary or lower (ISCED 0-2) used as the reference category (see Table 5.3 for means and definitions). Marital status is included, as is urban/rural location to allow for differences in the availability of health services and pharmacies. Employment status is also controlled through self-report of current job situation according to six categories:

[36] Individuals were asked if they had been told by a doctor to have any of the conditions: 1) heart attack, myocardial infarction, coronary thrombosis or other heart like congestive heart failure; 2) high blood pressure; 3) high blood cholesterol; 4) stroke or cerebral vascular disease; 5) diabetes; 6) Chronic lung disease (chronic bronchitis/ emphysema); 7) asthma; 8) arthritis, osteoarthritis, or rheumatism; 9) osteoporosis; 10) cancer or malignant tumour, leukaemia or lymphoma (excluding minor skin cancers; 11) stomach or duodenal ulcer, peptic ulcer; 12) Parkinson disease; 13) cataracts; 14) hip or femoral fracture

retired, employed or self-employed, unemployed, permanently sick or disabled, homemaker and other. Given the relatively small number of observations falling into some of these groups, I split the variable into three dummies, namely employed (including self-employed), retired which is used as a reference category and inactive which includes the rest of the categories.

I control for voluntary supplementary health insurance that provides cover for a larger choice of drugs and/or full drugs expenses. [37] The inclusion of health insurance introduces a potentially endogenous variable. Individuals with high expected drug expenditures are expected to be more likely to take out insurance coverage. This is taken into account in interpreting the coefficient on the insurance variable. Since the correlation between insurance status and the variables of main interest, namely income and the presence of at least one chronic condition, is low (0.079 and 0.004 respectively) any endogeneity bias introduced by the insurance variable should not have a strong impact on the coefficients of these variables. This was confirmed by repeating the analysis without the insurance variable included.

Finally, the individual's budget is measured by equivalent gross annual household income per person. This includes income received from employment and self-employment, private non-labor income (from investments property, private

[37] Individuals are asked the following question (HC060): "Do you have any voluntary, supplementary or private health insurance for at least one of the following types of care in order to complement the coverage offered by the National Health System? If yes, please say what is covered: 1) Medical care with direct access to specialists; 2) Medical care with an extended choice of doctors; 3) Dental care; 4) A larger choice of drugs and/or full drugs expenses (no participation); 5) An extended choice of hospitals and clinics for hospital care; 6) (Extended) Long term care in a nursing home, 7) (Extended) Nursing care at home in case of chronic disease or disability; 8) (Extended) Home help for activities of daily living (household, etc.), 9) Full coverage of costs for doctor visits (no participation), 10) Full coverage of costs for hospital care (no participation)

regular transfers to the household) and pensions. The income variable is scaled by the OECD modified equivalence scale[38] in order to account for household size and composition. As with OOP payments, it is deflated by purchasing power parity adjustment factors to take account of cross-country differences in price levels and the logarithmic transformation is applied.

[38] The scale assigns a value of 1 to the household head, of 0.5 to each additional adult member and 0.3 to each child below 13 years.

Table 5. 3: Definitions and Sample Means of Control Variables

VARIABLES	Variable Description	Full Sample	OOPs for drugs>0	AU*	BG	DK	FR	DE	GR	IT	NL	SP	SE	CH
Male	1 if male	0.45	0.42	0.44	0.46	0.47	0.45	0.45	0.46	0.45	0.47	0.46	0.47	0.46
Age	Age in years	65.59	65.93	64.13	65.81	64.50	65.77	65.34	65.48	65.82	64.27	66.31	66.00	64.55
Symptoms	1 if individual suffers from ≥2 symptoms [+]	0.40	0.46	0.32	0.41	0.38	0.41	0.40	0.34	0.41	0.29	0.46	0.41	0.23
Numeracy	Mathematical performance[++]	3.15	3.21	3.61	3.25	3.44	3.05	3.56	3.27	2.82	3.53	2.43	3.56	3.71
orientation	Orientation to date, month, year, day[++]	3.72	3.75	3.80	3.75	3.75	3.69	3.78	3.77	3.75	3.70	3.56	3.78	3.83
Chronic	1 if at least one chronic disease	0.75	0.82	0.68	0.78	0.75	0.77	0.73	0.73	0.77	0.68	0.78	0.75	0.61
Mobility	1 if ≥2 mobility limitations[+++]	0.52	0.58	0.52	0.50	0.43	0.50	0.55	0.55	0.53	0.42	0.55	0.46	0.38
Depression	1 if depressed (EURO-D scale)	0.28	0.31	0.20	0.26	0.18	0.33	0.21	0.25	0.36	0.21	0.36	0.21	0.19
BMI	body mass index	26.39	26.44	26.69	26.56	25.56	25.90	26.49	26.95	26.27	26.22	27.28	25.79	25.41
Iadl	Number of IADL limitations	0.40	0.41	0.36	0.40	0.38	0.41	0.34	0.40	0.42	0.34	0.54	0.40	0.15
Neversmoked	1 if never smoked daily for at least one year (ref: smoker)	0.56	0.57	063	0.52	0.36	0.59	0.57	0.57	0.56	0.39	0.62	0.46	0.56
formersmoker	1 if former smoker	0.26	0.26	0.18	0.31	0.33	0.27	0.25	0.18	0.26	0.37	0.21	0.37	0.24
VeryGoodHealth	1 if self-reported health very good (ref: bad/very bad)	0.13	0.09	0.17	0.18	0.24	0.13	0.11	0.22	0.08	0.18	0.10	0.27	0.32
GoodHealth	1 if self reported health good	0.43	0.41	0.43	0.49	0.45	0.48	0.42	0.39	0.40	0.50	0.40	0.35	0.48
FairHealth	1 if self reported health fair	0.32	0.36	0.30	0.25	0.22	0.29	0.32	0.30	0.38	0.26	0.32	0.27	0.16
VPHI_drugs	1 if having any voluntary, supplementary or private health insurance that covers larger choice of drugs and/or full drugs expenses	0.15	0.07	0.02	0.03	0.13	0.70	0.006	0.006	0.004	0.28	0.009	0.004	0.07
secondaryEduc	1 if highest Education (ISCED 3 and 4) (ref: low education- ISCED 0,1,2)	0.31	0.35	0.48	0.25	0.42	0.27	0.55	0.22	0.18	0.23	0.08	0.25	0.22
tertiaryEduc	1 if highest level education (ISCED 5-6)	0.17	0.17	0.21	0.23	0.33	0.19	0.24	0.14	0.06	0.20	0.08	0.22	0.28
Employed	1 if employed/ self-employed (ref: retired)	0.26	0.24	0.21	0.22	0.38	0.27	0.28	0.25	0.20	0.30	0.23	0.39	0.41
Inactive	1 if unemployed/permanently sick/ disabled/ homemaker	0.23	0.22	0.16	0.25	0.09	0.17	0.18	0.28	0.25	0.34	0.41	0.06	0.14
Urban	1 if live in big city or large town 0 if live in suburbs of big city, small town or village/rural area	0.30	0.32	0.34	0.21	0.36	0.22	0.27	0.60	0.26	0.28	0.48	0.42	0.17
Single	1 if live as single 0 if live with spouse/ partner	0.34	0.35	0.39	0.27	0.34	0.31	0.34	0.33	0.35	0.31	0.36	0.37	0.31
log income	logarithm of equivalent gross annual household income (in Euros PPP adjusted)	9.68	9.71	9.81	9.82	10.10	9.91	9.87	9.16	9.43	10.03	9.10	10.07	10.06

***** Country specific means refer to the whole sample in each country and not just those with positive OOP payments; **+** Individuals were asked if they were bothered by symptoms in the past six months: 1)pain in back, knees, hips, joints; 2) heart trouble, angina chest pain; 3) breathlessness; 4) persistent cough; 5) swollen legs; 6) sleeping problems; 7) falling down; 8) fear of falling down; 9) dizziness, faints or blackouts; 10) stomach or intestine problems; 10) incontinence.
++A score of 1-5 was used. The higher the score the better
+++Individuals were asked if they had difficulties with: 1) walking 100metres; 2) sitting for two hours; 3) getting up from a char; 4) climbing one or several flights of stairs without resting; 5) stooping, kneeling or crouching; 6) reaching or extending arms above shoulder level; 7) pulling/pushing large objects; 8) lifting weights over 10pounds/5 kgs; 9) picking up a small coin from a table.

5.5 Results

5.5.1 Baseline Specification

I begin by estimating the two-part model of pharmaceutical expenditures using the full sample of SHARE respondents pooled across all countries with country specific intercepts. Netherlands is used as the reference country as it has the lowest mean level of pharmaceutical OOP payments. This analysis identifies variation across countries in pharmaceutical payments after controlling for differences in the needs and socioeconomic characteristics of the populations. In subsequent sections I examine whether the income effect varies across countries and whether the burden of pharmaceutical expenditures due to the onset of a chronic conditions differs between countries. I present the marginal effects from the probit and OLS parts of the two part model, as well as the full marginal effects on both the log and euro scales (all are calculated at mean values of the covariates). Standard errors for the probit effects are made robust to heteroscedasticity. Bootstrapped standard errors are computed for the full marginal effect from the two-part model on the log scale.

There is a positive and significant income effect on OOP payments for pharmaceuticals (Table 5.4). Income raises both the likelihood of incurring OOP payments and their mean level. The elasticity of the latter with respect to income is 0.04%. So, over the positive range of expenditures, OOP payments are regressive. The full marginal effect of log income is €7.98; a 1% increase in income raises pharmaceutical payments by an average of only 8 cents across all countries.

As would be expected, the presence of a chronic diagnosed condition has a very strong effect on the likelihood of incurring OOP payments, but also on the level of the payments. In aggregate, having a chronic condition is associated with an

increase of €66.91 in OOP payments. All the ill-health variables, with the exception of BMI and IADL limitations, have a positive effect on the likelihood of incurring OOP payments but also on the amount of OOP payments (among those who have any). Very good self perceived health has a strong negative effect on the likelihood of incurring pharmaceutical OOP payments and reduces the amount of payments. In total, those reporting very good health spend €115 less per year on drugs than those reporting bad or very bad health. Former smokers are more likely to incur pharmaceutical OOP payments but also are associated with higher levels of OOP payments compared to current smokers. This might be related to a health condition playing a role in the decision to quit smoking. Males have both a lower probability of incurring OOP payments and lower mean levels. In total, controlling for all else, men spend on average €17 less than women per year on pharmaceuticals.

Individuals with voluntary health insurance for drugs are less likely to incur OOP payments, but, understandably if coverage is 100%, the level of payment does not vary significantly with insurance cover. In total, those with supplementary insurance cover pay €17 less per year, but given the lack of control for endogeneous selection into insurance; this cannot be interpreted as the causal effect of insurance. Being employed does not affect the probability of incurring OOP payments but is associated with lower levels of OOP payments compared to those retired. Living in urban areas is significantly associated with a higher probability of positive OOP payments, but also higher levels of OOP, with the result that payments are €11 higher per year for urban dwellers. This might be due to an "availability effect" (Carlsen & Grytten, 1998; Juerges, 2007b) but it could also reflect an income or wealth effect that is not fully captured by the income measure.

After controlling for these need and socioeconomic determinants, pharmaceutical expenditures still vary substantially across countries. Compared to the Netherlands, in every country there is significantly higher probability of incurring pharmaceutical OOP payments. The level of payments is also significantly higher in most other countries than in the Netherlands, with the exceptions of France with which there is no significant difference and Germany where levels of payments are significantly (10%) lower. Relative to the Netherlands, annual pharmaceutical expenditures per individual are, for example, only €17 higher in France, but are €191 greater in Greece and €203 higher in Belgium. Individuals with the same or similar health and socioeconomic circumstances living in the Belgium are significantly less protected against pharmaceutical expenses than their neighbors in France and the Netherlands.

As seen in chapter 3, the Netherlands has the lowest utilization of drugs compared to all other countries. So the low out of pocket expenditures is attributable not only to low cost-sharing for prescription drugs but also to low levels of pharmaceutical utilization. Interestingly, although France is one of the countries with the highest level of pharmaceutical utilization, it has relatively low levels of OOP expenditures. One could argue that insurance coverage (taking into account the supplementary health insurance coverage) is very high in the French population and effective in protecting the elderly population from the burden of out-of-pocket payments. In Germany, although the probability of taking medications is significantly above the average (especially for those diagnosed with a certain condition), and the prices of pharmaceuticals are on average the second highest among the SHARE countries, the level of OOP expenses is relatively modest, suggesting that that the income dependent annual out-of-pocket maximum (and the reduced maximum for

those chronically ill) is effective in protecting the elderly from high out-of-pocket payments. Denmark, on the other hand, lies among the countries with relatively low levels of pharmaceutical utilization. However, the level of payments for medicines is relative high, presumably a reflection of the extensive cost-sharing applied to pharmaceuticals, the limited impact of the protection mechanisms but also the relatively high levels of pharmaceutical prices. Sweden, is a country with significantly lower levels of pharmaceutical utilization compared to the SHARE average. However, Sweden follows a consumption based approach and although out-of-pocket payments are capped annually there are no exemptions or reduced payments implemented. In Belgium, the high levels of out-of-pocket payments are to be expected not only due to the extensive cost-sharing but also due to the fact that it is a country with relatively high levels of pharmaceutical use. In Greece, despite the fact that prices of pharmaceuticals are the lowest among the SHARE countries, the high levels of OOP payments are to be attributed to a combination of the reimbursement policies applied and the high levels of pharmaceutical utilization.

Table 5.4: Marginal Effects from Two-Part model of Out-of-Pocket Payments for Prescription Drugs

VARIABLES	Marginal Effect on Pr(OOP>0) Probit (Robust SE)	Marginal Effect on E[ln OOP | OOP>0] OLS (Robust SE)	Marginal Effect on Pr(OOP>0)* E[ln OOP|OOP>0] TPM.(bootstrapped SE)	Marginal Effect on Pr(OOP>0)* E[OOP|OOP>0] (Euros)
log income	0.013** (0.004)	0.044** (0.010)	0.086** (0.012)	7.976
Male	-0.053** (0.008)	-0.066** (0.021)	-0.286** (0.039)	-17.334
Age	-0.001 (0.000)	0.009** (0.001)	0.003 (0.003)	1.118
symptoms	0.076** (0.008)	0.182** (0.022)	0.460** (0.038)	34.387
numeracy	0.014** (0.004)	0.017 (0.010)	0.076** (0.018)	4.407
Chronic	0.262** (0.009)	0.421** (0.028)	1.465** (0.045)	66.914
orientation	0.023** (0.006)	-0.006 (0.019)	0.102** (0.032)	2.548
Mobility	0.059** (0.008)	0.087** (0.022)	0.327** (0.038)	19.783
depression	0.036** (0.009)	0.053* (0.023)	0.199** (0.052)	12.594
BMI	-0.002* (0.001)	0.006** (0.002)	-0.006 (0.004)	0.5725
Iadl	-0.008 (0.004)	0.035** (0.012)	-0.015 (0.021)	3.698
neversmoked	0.031** (0.009)	-0.008 (0.026)	0.137** (0.036)	3.481
formersmoker	0.049** (0.010)	0.073* (0.029)	0.268** (0.043)	17.031
VeryGoodHealth	-0.152** (0.017)	-0.808** (0.045)	-1.188** (0.085)	-114.479
GoodHealth	-0.008 (0.014)	-0.676** (0.036)	-0.440** (0.059)	-91.518
FairHealth	0.024 (0.013)	-0.379** (0.034)	-0.118 (0.068)	-46.318
secondaryEduc	0.023* (0.009)	0.088** (0.024)	0.157** (0.045)	15.568
tertiaryEduc	0.054** (0.010)	0.159** (0.028)	0.345** (0.056)	30.490
VPHI_drugs	-0.083** (0.014)	-0.029 (0.056)	-0.401** (0.082)	-16.501
employed	-0.019 (0.011)	-0.067* (0.029)	-0.128* (0.062)	-11.885
Inactive	-0.042** (0.010)	0.031 (0.027)	-0.177** (0.058)	-1.885
Urban	0.032** (0.007)	0.052* (0.020)	0.178** (0.037)	11.664
Single	-0.009 (0.008)	-0.139** (0.022)	-0.124** (0.034)	-19.998
Austria	0.393** (0.006)	0.347** (0.076)	2.027** (0.053)	110.31
Belgium	0.465** (0.006)	0.840** (0.074)	2.655** (0.047)	203.364
Denmark	0.378** (0.007)	0.512** (0.078)	2.056** (0.065)	139.942
Germany	0.415** (0.006)	-0.182* (0.074)	1.811** (0.056)	39.118
Greece	0.405** (0.007)	0.755** (0.074)	2.324** (0.046)	190.832
France	0.101** (0.016)	0.016 (0.088)	0.479** (0.103)	16.605
Italy	0.373** (0.008)	0.694** (0.075)	2.143** (0.055)	172.667
Spain	0.161** (0.015)	0.403** (0.086)	0.988** (0.086)	87.733
Sweden	0.409** (0.007)	0.270** (0.073)	2.055** (0.053)	96.721
Switzerland	0.339** (0.009)	0.645** (0.083)	1.956** (0.052)	168.537
Observations	26490	15433		
Log-Likelihood	-13748.329			
Adj R-squared		0.1882		
White test for heteroskedasticity p-value		0.5830		

Notes: All marginal effects are computed at the means of the covariates. *Significant at the 10 percent level. **Significant at the 5 percent level. ***Significant at the 1 percent level.

5.5.2 Cross-Country Differences in the Effect of Income

As described in section two, most social protection mechanisms against payments for pharmaceuticals are related either to income or the presence of chronic conditions and the design and extent of the protection differs across countries. The baseline specification reveals a small positive income effect on the likelihood and the level of pharmaceutical OOP payments. But this specification does not allow for the possibility that effect varies across countries, which might be expected given differences in cost-sharing arrangements and protection mechanisms. The same applies for the presence of chronic conditions. To explore whether there are differences in the effects of income and chronic conditions on pharmaceutical expenditures across countries I now extend the model to allow interaction terms between both income and chronic conditions, and the country dummies. In this sub-section, heterogeneity in the income effect is investigated. In the next, I consider heterogeneity in the effect of chronic conditions.

Due to its nonlinearity, an interaction effect in a probit model cannot be directly inferred from the sign and magnitude of the coefficient on the product of the two interacted variables. (C. Ai & Norton, 2003). Rather, the interaction effect must be obtained from the cross-derivative of the probability being examined.[39] Standard

[39] Let $\Pr(OOP > 0) = \Phi(\beta_1 x_1 + \beta_2 x_2 + \beta_{12} x_1 x_2 + Z\delta)$. In the case when both the interacted variables are dummies, the interaction effect is the discrete double difference

$$\frac{\Delta^2 \Pr(OOP > 0)}{\Delta x_1 x_2} = \Phi(\beta_1 + \beta_2 + \beta_{12} + Z\delta) - \Phi(\beta_1 + Z\delta) - \Phi(\beta_2 + Z\delta) + \Phi(Z\delta).$$ When one of the interacted variable is continuous (x_1) and the other is a dummy (x_2), the

errors can be obtained by the Delta method. These interactions effects and their standard errors are computed using the programs supplied by Ai & Norton (2003).

The estimated models allowing the income effects and the chronic conditions effects to vary across countries are presented in Tables 5.5 and 5.6 respectively. For both specifications Wald tests reject the null hypothesis of there being no interaction effects.

Income has a significant positive effect on both the likelihood of incurring OOP payments and their level in the Netherlands (the reference country) (Table 5.5). Compared with the Netherlands, the income effect on the probability of incurring OOP payments is significantly smaller in Sweden, Denmark and Belgium and is significantly larger in France. In the first three countries, the magnitude of the interaction effect is much smaller than the baseline effect for the Netherlands and so there is still a positive association between income and the probability of paying for drugs, but this association is weaker than that in the Netherlands. There are two possible interpretations of this difference. First, it could be low income is less of a constraint on access to pharmaceuticals in Sweden, Denmark and Belgium than in the Netherlands. However, the analysis in chapter 3 revealed no significant effect on income on the probability of using prescribed drugs, and there was certainly no evidence of any effect differing across countries. Alternatively, if the utilization of pharmaceuticals does not vary with income, then the significant interactions effects

---

interaction effect is the discrete difference (with respect x_2) of the single derivative (with respect to x_1): $\Delta \dfrac{\partial \Pr(OOP>0)}{\partial x_1} / \Delta x_2 = (\beta_1+\beta_{12})\phi\left((\beta_1+\beta_{12})x_1+\beta_2+Z\delta\right)-\beta_1\phi(\beta_1 x_1+Z\delta)$.

imply that the poor are less well protected from pharmaceutical expenditures in Sweden, Denmark and Belgium than they are in the Netherlands. This is plausible when one considers the policy environments. In Sweden, although pharmaceuticals expenditures are capped annually, there are no protection mechanisms for those with low-incomes, while in Denmark a consumption-based approach is in operation and preferential reimbursement is only offered to low income individuals who are high users. That the data are picking up the effect of this policy is further supported by the fact that the OLS results show no difference between Denmark and the Netherlands in the income effect on the level of OOP payments. In Belgium, although preferential reimbursement exists for retired people and those receiving disability benefits and meeting certain low-income criteria, total exemptions do not apply and so even the poor must make some payment for pharmaceuticals. On the other hand, in the Netherlands, patients are only obliged to pay the difference between the reference reimbursement price and the retail price. However, this policy is practically translated into almost zero copayments as the vast majority of the prescriptions drugs are priced below the reference price (Jansen, 2002). In France, where the income effect is stronger than in the Netherlands, there are co-payments for pharmaceuticals. However, the poor are exempt from these co-payments, which will strengthen the positive income effect. Although the better-off are more likely to take out supplementary insurance against co-payments, coverage is not complete and so all but the poor must make some payment. Consistent with this, there is no difference between France and the Netherlands in the income effect on the level of (positive) payments.

The OLS results show the level of OOP payments is significantly positively associated with income in the Netherlands. The coefficient implies an elasticity of

0.16%, which is four times larger than the average elasticity across all countries reported in Table 5.4. This indicates that pharmaceutical expenditures are more closely related to income in the Netherlands than they are in many of the other countries. This is seen explicitly in the interaction terms, which are significantly negative for Sweden, Greece, Spain and Italy indicating smaller income effects than in the Netherlands. In fact, for all four of these countries the magnitude of the interaction effect is approximately equal to that of the baseline income elasticity implying that the two effects cancel and there is no association between income and the (positive) level of pharmaceutical expenditures in these countries. F-tests confirm this (Greece (p=0.6130), Spain (p=0.9278), Italy (p=0.4939) and Sweden (p=0.6699)).

In Spain, pensioners (35% of the sample) and those permanently disabled (around 4% of the sample) are totally exempt from cost-sharing. There is also a range for drugs for chronic illnesses for which only 10% of the cost is paid by the patient. Those under 65 years of age pay a co-payment of 40% for prescribed pharmaceuticals independent of income. In Italy, prescriptions fees are applied in certain regions and co-payments may also take the form of a payment of the difference between the price of a more expensive pharmaceutical and a cheaper product containing the same active substance. In 2004, private pharmaceutical expenditures as a share of total pharmaceutical expenditure reached 32% and one-half of these comprise payments for non-reimbursed prescription pharmaceuticals (Class C) (Martini, Gallo, & Montilla, 2007). So, OOP payments are relatively high in Italy (see Table 5.2 and Table 5.4) and exemptions based on income and/or age apply only in some regions. As a result, it appears that these payments are particularly regressive. The lack of any income effect in Sweden and Greece is also consistent with the absence of policies to protect

those on low incomes from prescription charges in Sweden and the limitation of such protection to low-income pensioners in Greece.

Table 5.5: Two-Part model of Out-of-Pocket payments for Prescription Drugs Allowing Income Effect to Differ Across Countries- Marginal Effects

VARIABLES	Marginal Effect on Pr(OOP>0) Probit (Robust SE)	Marginal Effect on E[ln OOP | OOP>0] OLS (Robust SE)
Austria	0.395*** (0.007)	1.068 (0.742)
Germany	0.504***(0.010)	0.736 (0.730)
Sweden	0.399*** (0.006)	1.726** (0.741)
Greece	0.397*** (0.006)	2.185*** (0.719)
Spain	0.163*** (0.017)	1.906* *(0.761)
Italy	0.427*** (0.010)	2.056*** (0.739)
France	0.095*** (0.018)	0.730 (0.886)
Denmark	0.387*** (0.007)	0.912 (0.855)
Switzerland	0.350*** (0.010)	1.459* (0.806)
Belgium	0.427*** (0.005)	2.111*** (0.722)
log income	0.0193*** (0.005)	0.155** (0.067)
Austria*income	-0.019 (0.014)	-0.070 (0.073)
Germany* income	-0.018 (0.014)	-0.090 (0.072)
Sweden* income	-0.024* (0.014)	-0.144** (0.072)
Greece* income	-0.021 (0.013)	-0.144** (0.071)
Spain * income	-0.026 (0.016)	-0.152**(0.076)
Italy* income	-0.017 (0.0141)	-0.136* (0.073)
France* income	0.036** (0.017)	-0.070 (0.087)
Denmark* income	-0.031** (0.014)	-0.039 (0.084)
Switzerland* income	-0.008 (0.014)	-0.080 (0.079)
Belgium* income	-0.025*(0.013)	-0.126 (0.071)
male	-0.053*** (0.008)	-0.067** (0.021)
age	-0.001 (0.000)	0.009** (0.001)
symptoms	0.077*** (0.008)	0.182** (0.022)
numeracy	0.014*** (0.004)	0.017 (0.010)
chronic	0.263*** (0.009)	0.420** (0.028)
orientation	0.023*** (0.006)	-0.007 (0.019)
mobility	0.060*** (0.008)	0.087** (0.022)
depression	0.037*** (0.009)	0.054* (0.023)
BMI	-0.002** (0.001)	0.006** (0.002)
iadl	-0.008* (0.004)	0.035** (0.012)
neversmoked	0.033*** (0.010)	-0.008 (0.026)
formersmoker	0.050*** (0.010)	0.074* (0.029)
VeryGoodHealth	-0.154*** (0.017)	-0.808** (0.045)
GoodHealth	-0.008 (0.014)	-0.675** (0.036)
FairHealth	0.025* (0.014)	-0.376** (0.034)
secondaryEduc	0.022** (0.009)	0.089** (0.024)
tertiaryEduc	0.053*** (0.010)	0.157** (0.028)
VPHI_drugs	-0.084*** (0.014)	-0.030 (0.056)
employed	-0.017 (0.011)	-0.068* (0.029)
inactive	-0.042*** (0.010)	0.028 (0.027)
urban	0.032*** (0.007)	0.053** (0.020)
single	-0.009 (0.009)	-0.136** (0.022)
Sample Size	26490	15433
Log-Likelihood	-13726.739	
Adj R-squared		0.1886
Wald test for interactions (p-value)	36.41 (p=0.0001)	3.08 (p=0.0004)

Notes: marginal effects from probit computed at the means of covariates. Standard errors for probit marginal effects computed by the delta method (Ai and Norton, 2003). *Significant at the 10 percent level. **Significant at the 5 percent level. ***Significant at the 1 percent level.

5.5.3 Cross-Country Differences in the Effect of Chronic Conditions

Since the country dummies are now interacted with the chronic condition dummy, I present in Table 5.6 the partial country effects on the probability of incurring OOP payments for those without a chronic condition.40 The probability is significantly higher in all countries than it is in the Netherlands (the reference)41. The OLS results show that the level of (positive) payments in the other countries (for those with no chronic conditions) differ less from those in the Netherlands. They are significantly lower in Germany and significantly higher in Greece and Italy.

In the Netherlands, the presence of a diagnosed chronic condition raises the likelihood of incurring any OOP payments but has no statistically significant effect on the (positive) amount of payments. Although prescription only drugs are practically fully reimbursed, OTC products are generally not reimbursed, with the exception of some OTC products specifically intended for chronic treatment. In Austria, Belgium, France and Spain the partial effect of a chronic condition is significantly smaller that it is in the Netherlands, while in Denmark, Germany and in Greece it is significantly greater. These differences are generally consistent with policy differences regarding exemptions from cost-sharing of individuals with chronic conditions. Exemption is complete in France, Spain, Italy and (for particular conditions) in Belgium, but only partial in Denmark, Germany and Greece.

The OLS results show that, with the exceptions of France, Italy and Spain, a chronic condition has a larger impact on the level of pharmaceutical expenditures in

[40] A partial effect could be computed with the chronic dummy set to its sample mean value but this would be rather difficult to interpret.

[41] Partial country effects in the probit model were also computed for those with chronic conditions and for all countries the effects were positive and statistical significant. However, only the partial country effects for those without a chronic condition are presented in Table 5.6, in order to provide consistent estimates with those of the OLS specification.

all countries than it does in the Netherlands. Again, note that the exceptions are the three countries that totally exempt those with chronic conditions from payments for pharmaceuticals. The largest effect of a chronic condition is in Switzerland, for which it is estimated that the onset of a condition raises (positive) pharmaceutical expenditures by a little less than 70%.[42] The effect is also very high in Denmark and in Germany, where the onset of a chronic condition raises positive pharmaceutical expenditures by around 65%[43]. Equivalently, the effect in Belgium, Austria and Greece is around 60%, 53% and 43%[44] respectively. The exceptions are France, Italy, the Netherlands and Spain for which there is no significant effect. These results indicate large differences across Europe in the extent to which the onset of chronic conditions increases the burden of pharmaceutical expenditures.

[42] 67.6%=(0.758-0.082)*100

[43] 64.2%=(0.724-0.082)*100

[44] Belgium[59.4%=(0.676-0.082)*100; Austria[52.9%=(0.611-0.082)*100; Greece[42.9%=(0.511-0.082)*100

Table 5.6: Two-Part model of Out-Of-Pocket Payments for Prescription Drugs Allowing Effect of Chronic Conditions to Differ Across Countries- Marginal Effects

	Marginal Effect on Pr(OOP>0) Probit (Robust SE)	Marginal Effects on E[ln OOP | OOP>0] OLS (Robust SE)
	chronic==0	
Austria	0.437*** (0.017)	-0.140 (0.170)
Belgium	0.434*** (0.016)	0.289 (0.173)
Denmark	0.279*** (0.028)	0.071 (0.197)
France	0.213*** (0.030)	-0.009 (0.197)
Germany	0.428***(0.024)	-0.768*** (0.168)
Greece	0.324*** (0.023)	0.343** (0.172)
Italy	0.415*** (0.025)	0.558*** (0.176)
Spain	0.359*** (0.027)	0.285 (0.184)
Sweden	0.334*** (0.022)	-0.222 (0.169)
Switzerland	0.304*** (0.028)	0.046 (0.184)
Chronic	0.174*** (0.011)	-0.082 (0.175)
Austria*chronic	-0.083*** (0.018)	0.611** (0.187)
Belgium*chronic	-0.046 *** (0.017)	0.676** (0.189)
Denmark* chronic	0.081***(0.029)	0.724** (0.184)
France*chronic	-0.133*** (0.033)	0.028 (0.217)
Germany*chronic	0.081*** (0.025)	0.724** (0.184)
Greece*chronic	0.052** (0.023)	0.511** (0.187)
Italy*chronic	-0.011 (0.026)	0.185 (0.192)
Spain*chronic	-0.236*** (0.031)	0.134 (0.205)
Sweden*chronic	0.037 (0.023)	0.605** (0.184)
Switzerland*chronic	0.031 (0.029)	0.758** (0.205)
log income	0.013*** (0.003)	0.044** (0.010)
male	-0.053*** (0.008)	-0.067** (0.021)
age	-0.000 (0.000)	0.009** (0.001)
symptoms	0.081*** (0.009)	0.180*** (0.022)
mobility	0.067*** (0.008)	0.093*** (0.022)
orientation	0.021*** (0.007)	-0.007 (0.019)
numeracy	0.015*** (0.004)	0.017 (0.010)
iadl	-0.008* (0.004)	0.035** (0.012)
depression	0.042*** (0.009)	0.057** (0.023)
neversmoked	0.031*** (0.010)	-0.007 (0.026)
formersmoker	0.048*** (0.010)	0.073** (0.029)
VeryGoddHealth	-0.150*** (0.018)	-0.804***(0.045)
GoodHealth	0.018 (0.015)	-0.679*** (0.036)
FairHealth	0.022 (0.014)	-0.379*** (0.033)
BMI	-0.002** (0.001)	0.006*** (0.002)
VPHI_drugs	-0.084*** (0.015)	-0.033 (0.055)
secondaryEduc	0.023***(0.009)	0.089*** (0.024)
tertiaryEduc	0.057*** (0.010)	0.159*** (0.028)
employed	-0.015 (0.011)	-0.061** (0.029)
inactive	-0.039*** (0.010)	0.034 (0.027)
single	-0.011 (0.009)	-0.139*** (0.022)
urban	0.032*** *0.007)	0.052*** (0.020)
Sample size	26490	15433
Log-Likelihood	-13442.881	
Adj R-squared		0.1929
Wald test for interactions (p-value)	622.46 (0.000)	7.95 (0.000)

Notes: marginal effects from probit computed at the means of covariates. Standard errors for probit marginal effects computed by the delta method (Ai & Norton, 2003). *Significance at the 10%, ** Significance at the 5% level, *** Significance at the 1% level.

5.6. Discussion

The analysis presented in this chapter reveals substantial variation in out-of-pocket payments for prescribed pharmaceuticals across Europe that are persistent even after controlling for differences in the health care needs and socioeconomic characteristics of populations. The probability of incurring pharmaceutical OOP payments is higher in all countries when compared to the Netherlands. In addition, with the exceptions of France and Germany, the levels of payments are higher in all countries in comparison with the Netherlands, and are highest in Belgium (€203), Greece (€191), Italy (€173) and Switzerland (€168). The low levels of payments in the Netherlands could be attributable not only to the fact that cost-sharing is low but also to the lowest levels of pharmaceutical utilization (see chapter 3). By contrast, the low levels of payments for medicines observed in France would appear to result from pricing and coverage policies, since the utilization of drugs is the highest of all the SHARE countries. The reimbursement and protection policies applied in Germany also seem to be effective in protecting against high levels of pharmaceutical OOP payments as utilization of pharmaceuticals is significantly above the average. Denmark provides an opposite example. Utilization of medicines is low but payments are quite high (€139). This derives from relatively high prices and restricted insurance coverage. In Greece, it appears that low prices on their own are not effective in protecting the elderly population from high payments for pharmaceuticals, which reflect reimbursement policies but also the utilization patterns.

The analysis also reveals an income effect that differs across countries. Based on the results in Chapter 3, that do not show any cross-country differences in the effect of income on utilization, the significant interaction effects reported in table 5.5 indicate that the poor are less protected from medicine charges in Sweden, Denmark

and Belgium compared to those in the Netherlands. These results are consistent with the reimbursement policies applied in these countries. In Sweden, no exceptions or reduced rates are offered for those with low-incomes, while in Denmark preferential reimbursement is granted to low-income individuals after they exceed a certain amount paid out-of-pocket. This is also indicated by the fact that, regarding the levels of (positive) OOP payments, the income effect does not vary between Denmark and the Netherlands. In France, the income effect appears stronger compared to the Netherlands, reflecting the fact that despite the cost-sharing applied to pharmaceuticals, those with low incomes are fully exempt from user charges. The strong negative income effect in Italy and in Greece, indicate the protection mechanisms for the low income groups. In Italy, exemptions based on income apply only to some regions while in Greece exemptions based on low-income do not apply and only the low-income pensioners are granted reduced co-payment rates.

The analysis investigated how the effect of the presence of chronic conditions varies across countries. The results are consistent with the differences in reimbursement policies applied. For example, in Switzerland, where there are no protection mechanisms in relation to chronic conditions, the onset of a chronic condition raises positive OOP payments by almost 70%. Protections for the chronically ill are also limited in Belgium (where only preferential reimbursement applies) and to a lesser degree in Greece (where a combination of full exemptions and reduced co-payments rates is implemented, depending on the condition). On the contrary, in France, Italy and Spain reimbursement policies are rather effective in protecting those with chronic conditions against pharmaceutical OOP payments.

Even though the analysis does not identify which country is closer to the optimal policy (with respect to both efficacy and equity), it clearly indicates

differences in pharmaceutical OOP payments across countries. Although the evidence presented is circumstantial rather than decisive based on causal analysis, it does suggest that policies adopted with respect to protection of the poor and chronically ill do translate into significantly different exposure of these groups to a high burden of payments for pharmaceuticals across Europe.

CHAPTER 6: Conclusion

6.1 Issues Addressed

During the last twenty years there has been a substantial increase in pharmaceutical expenditures in the majority of the European countries, and spending on pharmaceuticals has, in part, been driving the rise in total healthcare expenditures. In response, policy makers have implemented various measures that can be categorized broadly into polices that aim to regulate the prices of pharmaceuticals and those that aim to influence demand and utilization. Most EU countries have adopted a combination of measures, the precise nature of which varies across countries.

In addition, in recent decades, healthcare systems around Europe, although predominantly funded by public sources, have shifted towards private sources of finance in search of supplementary sources of funding that can help maintain the long-term financial viability of healthcare. This shift has been accomplished by limiting the ranges of healthcare services covered by public benefit packages (the patient is required to pay the full cost of some therapies not covered by public insurance), but mainly through the implementation of cost sharing (patients are required to pay part of the cost of the public healthcare services received). In some countries, such as Greece, private expenditures may be further inflated by informal payments to healthcare providers for services that should, in principle, be covered by the public benefit package. All European countries apply some sort of cost sharing for pharmaceuticals, while some countries require user charges also for outpatient and inpatient healthcare services. The shift to private financing has mainly been due to increasing out-of-pocket payments, there being a limited role of private insurance in the majority of European healthcare systems. Out-of-pocket payments create a

financial barrier to the access of healthcare services, increase the financial risk associated with illness and raise concerns about regressivity in the financing of healthcare.

Greece holds an extreme position within Europe in relation to these issues. Pharmaceutical expenditures and utilization are relatively high. The focus of policy has been the regulation of pharmaceuticals prices, while no effective measures have been implemented to address the high demand of pharmaceuticals, or to encourage physicians to prescribe more rationally and to substitute cheaper generics for pharmacologically equivalent brand name products. The public contribution to healthcare financing is limited compared to the levels in other EU-15 countries, with private OOP payments financing more than half of all healthcare. This leaves households exposed to a substantial financial risk from illness.

This thesis has addressed research questions arising from these important issues concerning the determinants of the consumption of pharmaceuticals and the economic consequences for households of spending on medicines and other types of health care. The main findings emerging from each chapter are summarized in the following section.

6.2 Research Findings

The second chapter considered the impact of price regulations on overall pharmaceutical expenditures in Greece. The analysis used data from the largest Social Insurance Fund (IKA) that covers more than 50% of the population for the period 1991-2003. Strict price regulations have been successful in keeping prices of pharmaceuticals at low levels by European standards. In particular, relative prices of pharmaceuticals have been reduced by more than half (55%). Nevertheless, real drug

spending increased by 146%. Volumes of pharmaceuticals consumed increased during the period by 32% contributing to the rise in expenditure. This rise in quantity is attributable to an increase in the number of prescription issued per doctor visit, rather than an increase in the number of visits, or the population size. However, the largest part (312%) of the increase in real expenditure is attributable to changes in the composition of the drugs prescribed. That is, there is a product mix-effect, with a shift of prescribing towards innovative, hopefully more effective, but also more expensive products.

This analysis suggests that price regulatory policies are a weak mechanism for constraining total pharmaceutical expenditures. There are important gaps in healthcare policy, characterized by the absence of mechanisms to monitor physicians' prescribing patterns, a lack of incentives for generic prescribing and a general failure to promote of cost-conscious behavior not only in the utilization of medicines but throughout the healthcare sector. It is argued that greater attention should be paid to the implementation of mechanisms that control and monitor prescribing behavior but also to the provision of incentives for doctors and pharmacists to operate in a more cost-effective manner with respect to the prescription and issuing of medicines. These gaps in Greek pharmacoeconomic policy are made apparent through comparison with other European countries. Elsewhere in Europe policies, such as prescribing budgets, guidelines to promote cost-effective prescribing and the promotion of generic prescribing, have been effective in containing pharmaceutical expenditures by limiting the product-mix effect. Promoting, particularly through financial incentives, the substitution of cheaper generic drugs for more expensive off-patent branded products can be effective in constraining pharmaceutical expenditures.

The third chapter analyzed the relative importance of population versus institutional factors in explaining cross-country variation in the utilization of pharmaceuticals among older Europeans. Use of pharmaceuticals is examined among samples of individuals aged 50+ in eleven European countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden and Switzerland) using data from the first wave of the Survey of Health, Ageing and Retirement in Europe (SHARE). These data make it possible to focus on individuals diagnosed with medical conditions for which effective drug therapies exist and are generally regarded to be advantageous (i.e. hypertension, high blood cholesterol, diabetes, asthma, arthritis, heart attack, and stroke or cerebrovascular disease). Micro data are supplemented by indicators of the regulation and supply of pharmaceuticals, to identify variance in the utilization of medications that is explained by policy amenable factors. Organizational factors include the density of pharmacies and physicians, retail prices, reimbursement rates, restrictions on retailing of pharmaceuticals and incentives designed to influence prescribing behavior.

The analysis reveals substantial differences in the utilization of pharmaceuticals across Europe that carry over into disparities in pharmaceutical expenditures. Differences in population health and demographics account for almost three-quarters of the cross-country variation in the propensity to use pharmaceuticals among all older Europeans. However, after restricting attention to individuals with a diagnosed condition, differences in population health and demographics explain only a minor 12% of the cross-country variation. This points to substantial variation in the treatment of individuals with the same, or similar, medical conditions.

Differences in the distribution of enabling factors, i.e. education and income, appear to play no role in explaining cross-country differences in pharmaceutical

utilization. Although income has a positive significant effect on utilization in the whole population of older individuals, there is no effect among those with a diagnosed condition, nor is there evidence that the income effect varies across countries.

After restricting the attention to individuals with a diagnosed condition and controlling for health, demographic and socioeconomic status, the proxies for health sector organizational factors explain more than half of the cross-country variation in utilization. Organizational differences are more important in explaining variation in receipt of medication for serious conditions, such as asthma, arthritis, diabetes, heart attack and stroke, for which 60-80% of the cross-country variation can be explained by population and organizational factors, and are less important for asymptomatic conditions, such as high cholesterol and hypertension, for which less than 35% of the variation is explained. After controlling for differences in healthcare need, socioeconomic characteristics and organizational determinants, more than one-third of the cross-country variation remains unexplained. Although, this variation could partially be attributed to differences in healthcare needs that were not fully controlled for in the analysis, it also suggests an important role for cultural differences in attitudes toward the prescription and utilization of pharmaceuticals, and in adherence to medical treatment. Evidence in the literature suggests not only that some populations are more prone to using medication than others but also that cultural differences have an important impact on the effectiveness of various policies.

Motivated by the increase in the role of out-of-pocket payments in healthcare financing across Europe and their continuing importance in Greece, chapter 4 investigated the extent and distribution of the burden of OOP payments for healthcare on household finances. The analysis of SHARE data reveals that the burden of OOP payments is very high in Greece. Across all households, on average, OOP payments

(for all health care services) absorb 7.4% of household income, the greatest share in any of the SHARE countries and four times higher than that in France and the Netherlands. One third of the elderly Greek households spend more than 5% of their household income on OOP payments; this proportion being ten times greater than that observed in the majority of the SHARE countries with the distinct exceptions of Belgium and Italy. Further, an exceptional 8% of the older Greek households spend more than 15% of their income on healthcare and an incredible 5% spend as much as 25%.

It is argued that these findings should make health care payments and their potentially catastrophic impact on household finances a priority issue on the health policy agenda of a country that has agreed to the European Commission common commitments to provide access to adequate healthcare services for all, to fight inequities in access and remove the risk of impoverishment due to the use of health care services (European Commission 2006). In accordance with previous findings, the analysis demonstrated that OOP payments are a regressive source of funding in all countries. However, the implications for the overall regressivity of health financing are much more potent for Greece, since more than 50% of total financing comes from out-of-pocket payments.

Although the descriptive nature of the analysis does not allow one to draw robust conclusions regarding the effectiveness of reimbursement and social protection policies implemented in other countries, it does confirm that some countries have succeeded in providing greater protection to the elderly population against the risks of catastrophic healthcare payments. Germany, which applies an income-dependent maximum ceiling on co-payments, but also Spain, which provides full exemptions from cost-sharing to all pensioners, provide two examples. In France, while co-

payments are charged for public health care, there is widespread coverage of these supplementary charges by private insurance, which limits the burden of OOP payments. Elderly households also appear to be relatively protected against catastrophic out-of-pocket payments in the Netherlands, followed by Austria, Switzerland, Denmark and Sweden. On the other hand, the similarities observed in the incidence of catastrophic payments in Greece and Italy suggests that public sector reimbursement policies are not the only issue that needs to be considered. Attention should be paid to the quality of services provided within the public sector, the low levels of satisfaction with the National Health Service reported in both countries and resultant push towards the use of private health care.

As would be expected given the high degree of patient cost-sharing for pharmaceuticals relative to other types of healthcare, pharmaceuticals account for the greatest share of OOP payments in 9 out of the 11 SHARE countries. Chapter five documents and investigates cross-country variation in pharmaceutical out-of-pocket payments. In order to identify the extent to which differences in pharmaceutical OOP payments for elderly Europeans reflect variation in healthcare systems and reimbursement mechanisms, the analysis controls extensively for variation that might be attributable to differences in health status and socioeconomic characteristics. To investigate the impact of different social protection mechanisms for those with low incomes and those with chronic conditions, the analysis examines whether the effect of income and of diagnosed medical conditions on OOP payments varies across countries. Data are again obtained from the first wave of SHARE, which fills a previous gap in the availability of comparable data on OOP payments that has hitherto hindered robust cross-country comparative analysis.

The analysis reveals substantial variation in pharmaceutical out-of-pocket payments incurred by the elderly populations across Europe, which are large even after controlling for differences in the healthcare needs and socioeconomic characteristics. For example, controlling for differences in demographic and socioeconomic characteristics, an older person in Greece can expect to pay 191€ more for medicines per year than a person with the same condition in the Netherlands. OOP payments for pharmaceuticals are highest in Belgium, Greece, Italy and Switzerland, and lowest in the Netherlands, France and Germany.

Consideration of these findings along with those of Chapter 3 on the utilization of pharmaceuticals leads to some interesting conclusions. OOP payments for medicines are lowest in France and the Netherlands, but the reasons for this differ markedly. Payments are low in the Netherlands both because cost-sharing is very low and, despite this, because utilization is the lowest in Europe. By contrast, utilization is highest in France but direct payments are low since there is extensive coverage by private insurance against co-payments and regulation constrains pharmaceutical prices. In Denmark, high prices and limited reimbursement raise direct payments and may also be responsible for relatively low levels of utilization. In Greece, it appears that the aggressive price regulation, which has kept prices at the lowest levels among the EU-15 countries, is not only ineffective in constraining overall pharmaceutical expenditures but also fails to protect elderly individuals from high levels of pharmaceutical OOP payments. The high levels of OOP payments observed in Greece are not simply attributable to limited reimbursement and social protection policies but reflect the tendency to high consumption of pharmaceuticals that may be partly cultural but presumably also derives from the lack of incentives for cost-effective prescription and utilization of medicines.

There is a positive income effect on direct payments for pharmaceuticals that differs across countries. Given that chapter 3 revealed no cross-country heterogeneity in the income effect on utilization, differential impacts of income on payments suggest that the poor are less protected from OOP payments for medicines in countries like Sweden, Denmark and Belgium compared to the Netherlands. The strong negative effect of income on payments for medicines observed in Italy and Greece suggest ineffective social protection mechanisms. The impact of a chronic medical condition on payments also varies significantly across countries consistent with variation in social insurance against the onset of chronic conditions. For example, in countries such as Switzerland, where there is no preferential reimbursement for the chronically ill, the onset of a chronic condition is associated with a 70% increase in pharmaceutical OOP payments. Protection is also limited in Belgium and Greece. On the other hand, in France, Italy and Spain there is more effective protection of the chronically ill against the burden of pharmaceutical OOP payments.

6.3 Limitations and Extensions

This thesis has presented comparative analyses of pharmaceutical utilization and expenditures and of healthcare payments. The author believes that this comparative approach, made possible by the rich data provided by SHARE, has been highly effective in understanding the determinants of pharmaceutical consumption and its impact on household finances. Variations in the utilization of and payments for pharmaceuticals across Europe have been highlighted and these variations have been interpreted in the light of policy differences. Of particular interest to the author, and perhaps most readers of this thesis, is the extreme position of Greece identified by the comparative analysis. The burden of OOP payments for healthcare in general and

pharmaceuticals in particular is heavy and one suspects that this has important implications for the economic behavior of households. Aggregate pharmaceutical expenditures are high and are rising more rapidly in Greece than in most other European countries despite maintenance of relatively low prices. This suggests that targeting prices is not sufficient to constrain pharmaceutical expenditures and that measures that operate on the incentives of prescribing physicians and pharmacists are required.

One must recognize, however, that the analysis presented in this thesis is largely descriptive and, as such, the implications that can be drawn for policy are circumstantial. The analysis has interpreted cross-country variation in pharmaceutical consumption and healthcare payments within the context of policy differences in policy in operation. This is highly suggestive that policy and organizational parameters do make an important contribution to the variation observed across Europe. But the analysis has not identified the impact of any particular policy on the consumption of pharmaceuticals or payments for healthcare. Doing so would required exogenous variation in policy. This may become possible as waves are added to the SHARE panel and there is both through time and across country variation available to identify policy impacts.

Comparative analysis is helpful in revealing policy options that may help serve objectives. However, one should bear in mind that measures that appear to operate effectively in one healthcare systems do not necessarily offer solutions to shortcomings of another. Consideration must be given to the broader socio-economic context, organizational framework and historical development of the system that condition how policies operate and their chances of being successfully implemented. Further, as highlighted by the analysis, characteristics specific to the culture of each

country should be taken into account in the formation of policy. It is not only narrow supply and demand side features of the healthcare sector that need to be addressed. Cultural attitudes towards health, the consumption of healthcare services, particularly pharmaceuticals, but also to the policy measures themselves may condition the strategies that are optimal within a particular environment.

Notwithstanding these caveats, it is hoped that the research presented in this thesis will arouse interest in the consumption of pharmaceuticals and payments for healthcare in Greece and throughout Europe, that it will inform related policy and that it will encourage research that can offer more concrete policy prescription.

References

AESGP. (2008). *AESGP facts & figures.* Retrieved December/12th, 2008, from http://www.aesgp.be/publications/Facts-Figures.asp

Ai, C., & Norton, E. C. (2000). Standard errors for the retransformation problem with heteroscedasticity. *Journal of Health Economics, 19*(5), 697-718.

Ai, C., & Norton, E. C. (2003). Interaction terms in logit and probit models. *Economics Letters, 80*, 123-129.

Andersen, R. (1968). *Behavioral model of familie's use of health services*. University of Chicago: Chicago, IL: Center for Health Administration Studies.

Andersen, R. (1995). Revising the bahavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior, 36*(1), 1-10.

Atella, V., Schafheutle, E., Noyce, P. R., & Hassell, K. Affordability of medicines and patients' cost reduction behaviors: Empirical evidence based on SUR estimates from italy and the united kingdom.

Bago d'Uva, T., van Doorslaer, E., Lindeboom, M., & O'Donnell, O. (2008). Does reporting heterogeneity bias the measurement of health disparities? *Health Economics, 17*, 351-375.

Berndt, E., Griliches, Z., & Rosett, J. (1993). Auditing the producer price index: Micro evidence from prescription pharmaceutical preparations. *Journal of Business & Economic Statistics, 11*(3), 251-264.

Birch, S. (1988). The identification of supplier-inducement in a fixed price system of health care provision. *Journal of Health Economics, 7*, 129-150.

Bolin, K., Lindgren, A., Lindgren, B., & Lundborg, P. (2009). Utilisation of physician services in the 50+ population: The relative importance of individual versus institutional factors in 10 european countries. *International Journal of Health Care Finance and Economics, 9*(1), 83-112.

Borsch-Supan, A., & Juerges, H. (2005). *The survey of health, ageing and retirement in europe: Methodology.* Mannheim: Mannheim Research Institute for the Economics of Aging (MEA).

Brindel, P., Hanon, O., Dartigues, J. F., Ritchie, K., Lacombe, J. M., Ducimetiere, P., et al. (2006). Prevalence, awareness, treatment, and control of hypertension in the elderly: The three city study. *Journal of Hypertension, 24*, 51-58.

Busse, R., & Riesberg, A. (2004). *Health care systems in transition: Germany*. Copenhagen: WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies.

Carlsen, F., & Grytten, J. (1998). More physicians: Improved availability or induced demand? *Health economics, 7*(6), 495-508.

Cerveri, I., Locatelli, F., Zoia, M., Corsico, A., Accordini, S., & de Marco, R. (1999). International variations in asthma treatment compliance: The results of the european community respiratory health survey (ECRHS). *European Respiratory Journal, 14*(2), 288-294.

Chaix- Couturier, C., Durand-Zaleski, I., Jolly, D., & Durieux, P. (2000). Effects of financial incentives on medical practice: Results from a systematic review of the literature and methodological issues. *International Journal for Quality in Health Care, 12*, 133-142.

Clemente, J., Marcuello, C., & Montanes, A. (2008). Pharmaceutical expenditure, total health-care expenditure and GDP. *Health Economics, 17*, 1187-1206.

Cole, J., Norman, H., Weatherby, L., & Walker, A. (2006). Drug copayment and adherence to chronic heart failure: Effect on cost and outcomes. *Pharmacotherapy, 26*(8), 1157-1164.

Coleman, P., & Nicholl, J. (2001). Influence of evidence-based guidance on health policy and clinical practice in england. *Quality in Health Care, 10*(4), 229-237.

Contiades, X., Golna, C., & Souliotis, K. (2007). Pharmaceutical regulation in greece at the crossroad of change: Economics, political and constitutional. *Health Policy, 82*, 116-129.

Costa-Font, J., Kanavos, P., & Rovira, J. (2007). Determinants of out-of-pocket pharmaceutical expenditure and access to drugs in catalonia. *Applied Economics, 39*(5), 541-551.

Cutler, D. M., & Lleras-Muney, A. (2006). *Education and health: Evaluating theories and evidence* No. NBER Working Paper No.12352)

Dabra, J. '. (2003). Pharmaceutical expenditure in spain: Evolution and cost containment measures during 1998-2001. *The European Journal of Health Economics,*

Dahlgren, D., & Whitehead, M. (2007). *European strategies for tackling social inequities in health: Levelling up part 2.* No. (Studies on social and economic determinants of population health, No.3)). Copenhagen:

De Graeve, D., & van Ourti, T. (2003). The distributional impact of health financing in europe: A review. *The World Economy, 26*(10), 1459-1479.

de Swaef, A., & Antonissen, Y. (2007). *Pharmaceutical pricing and reimbursement information. pharma profile- belgium*. Austria: Gesundheit Ósterreich GmbH.

Deaton, A. (2005). Measuring poverty in a growing world (or measuring growth in a poor world). *Review of Economics and Statistics, 85*(1), 1-19.

Deschepper, R., van der Stichele, R. H., & Haaijer-Ruskamp, F. (2002). Cross-cultural differences in lay attitudes and utilisation of antibiotics in a belgian and a dutch city. *Patient Education and Counseling, 48*, 161-169.

Dickson, M., & Jacobzone, S. (2003). *Pharmaceutical use and expenditure for cardiovascular disease and stroke: A study of 12 OECD countries* No. OECD Health Working Paper No.1)OECD.

Donatini, A., Lo Scalzo, A., Orzella, L., Cicchetti, A., Profili, S., Maresso, A., et al. (2008). *Italy: Health system review*. Brussels:

Dow, W. H., & Norton, E. C. (2003). Choosing between and intepreting the heckit and two-part models for corner solutions. *Health Services and Outcomes Research Methodology, 4*, 5-18.

Duan, N. (1983). Smearing estimate: A nonparametric retransformation method. *Journal of the American Statistical Association, 78*(383), 605-610.

Duan, N., Manning, W., Morris, C., & Newhouse, J. (1983). A comparison of alternative models for the demand for medical care. *Journal of Business and Economic Statistics, 1*(2), 115-126.

Duan, N., Manning, W., Morris, C., & Newhouse, J. (1984). Choosing between the sample-selection model and the multi-part model. *Journal of Business & Economic Statistics, 2*(3), 283-289.

Dubois, R. W., Chawla, A. J., Neslusan, C. A., Smith, M. W., & Wade, S. (2000). Explaining drug spending trends: Does perception match reality? *Health affairs (Project Hope), 19*(2), 231-239.

Duran, A., Lara, J., & van Waveren, M. (2006). Spain: Health system review. *Health Systems in Transition, 8*(4), 1-208.

Durieux, P., Galliac, B., Giraudeau, B., Doumenc, M., & Ravaud, P. (2000). Despite financial penalties french physicians' knowledge of regulatory practice guidelines is poor. *Archives of Family Medicine, 9*, 414-418.

Efstratopoulos, A., Voyaki, S., Baltas, A., Vratsistas, F., Kirlas, D., Kontoyannis, J., et al. (2006). Prevalence, awareness, treatment and control of hypertension in hellas, greece: The hypertension study in general practice in hellas (HYPERTENSHELL) national study. *American Journal of Hypertension, 19*(1), 53-60.

Elliott, R., Ross-Degnan, D., Adams, A., Safran, D. G., & Soumerai, S. (2007). Strategies for coping in a complex world: Adherence behavior among older adults with chronic illness. *Journal of general internal Medicine, 22*(6), 805-810.

Ess, S. M., Schneeweiss, S., & Szucs, T. D. (2003). European healthcare policies for controlling drug expenditure. *PharmacoEconomics, 21*(2), 89-103.

EUGLOREH 2007. (2008). *EU public health programme projekt global report on the health staus in the european union.* Retrieved 02/15, 2009, from http://www.eugloreh.it

Eurobarometer. (2004).

Eurobarometer. (2007).

European Federation of Pharmaceutical Industries and Associations. (2007). *The pharmaceutical industry in figures*

European Federation of Pharmaceutical Industries and Associations (EFPIA). (2007). *The pharmaceutical industry in figures* No. Key Data- 2007 update). Brussels- Belgium: European Federation of Pharmaceutical Industries and Associations.

EUROSTAT. (2008). *Population projections 2008-2060* No. 119/2008)

Fahey, T., Schroeder, K., Ebrahim, S., & Glynn, L. (2006). *Interventions used to improve control of blood pressure in patients with hypertension (review)* No. Cochrane Database of Systematic Reviews 2006, Issue 4)

France, G., Taroni, F., & Doratini, A. (2005). The italian health-care system. *Health Economics, 14*, S187-S202.

Geitona, M., Zavras, D., Hatzikou, M., & Kyriopoulos, J. (2006). Generics market in greece: The pharmaceutical industry's beliefs. *Health Policy, 79*, 35-48.

Gemmill, M., Costa-Font, J., & McGuire, A. (2007). In search of a corrected prescription drug elasticity estimate: A meta-regression approach. [Electronic version]. *Health Economics, 16*, 627.

Gemmill, M., Thomson, S., & Mossialos, E. (2008). What impact do prescription drug charges have on efficiency and equity? evidence from high-income countries. *International Journal for Equity in Health, 7*(12), 1-22.

Gerdtham, U. G. (1997). Equity in health care utilization: Further tests based on hurdle models and swedish micro data. *Health economics, 6*(3), 303-319.

Gerdtham, U. G., Johannesson, M., Gunnarsson, B., Marcusson, M., & Henriksson, F. (1998). The effect of changes in treatment patterns on drug expenditure. *PharmacoEconomics, 13*(1 Pt 2), 127-134.

Gerdtham, U. G., Johannesson, M., & Jonsson, B. (1993). Drug expenditure and new drug introductions: The swedish experience. *PharmacoEconomics, 4*(3), 215-225.

Gerdtham, U. G., & Lundin, D. (2004). Why did drug spending increase during the 1990s? A decomposition based on swedish data. *PharmacoEconomics, 22*(1), 29-42.

Gibson, T., Mark, T. L., Axelsen, K., Baser, K., Rublee, D., & McGuigan, K. (2006). Impact of statin copayments on adherence and medical care utilization and expenditures. *American Journal of Managed Care, 12*((special issue)), 11-19.

Goldman, D. P., Joyce, G., & Karaca-Mandic, P. (2006). Varying pharmacy benefits with clinical status: The case of cholesterol-lowering therapy. *American Journal of Managed Care, 12*(1), 21-28.

Goldman, D. P., & Smith, P. (2005). *Socioeconomic differences in the adoption of new medical technologies* No. NBER Working Paper No. 11218)

Reform of the System of Pharmaceutical Care, LawU.S.C. (2006).

Groot, W. (2000). Adaptation and scale of reference bias in self-assessments of quality of life. *Journal of Health Economics, 19*(3), 403-420.

Hassell, K., Atella, V., Schafheutle, E., Weiss, P., & Noyce, P. R. (2003). Cost to the patient or cost to the healtcare system? which one matters the most for GP prescribing decisions? *European Journal of Public Health, 13*, 18-23.

Hay, J., & Olsen, R. (1984). Let them eat cake: A note on comparing alternative models of the demand for medical care. *Journal of Business Economics and Statistics, 2*, 279-282.

Hill, J. (2005). Adherence with drug therapy in the rheumatic diseases part one: A review of adherence rates. *Muscoloskeletal Care, 3*(2), 61-73.

Hughes, D. A., & McGuire, A. (1995). Patient charges and the utilisation of NHS prescription medicines: Some estimates using a cointegration procedure. *Health Economics, 4*, 213-220.

ICAP. (2006). *ΙΔΙΩΤΙΚΕΣ ΥΠΗΡΕΣΙΕΣ ΥΓΕΙΑΣ* No. ΚΛΑΔΙΚΗ ΜΕΛΕΤΗ). Αθήνα, Ελλάδα: ICAP.

ICAP. (2007). *Ιδιωτικές Υπηρεσίες Υγείας* No. ΚΛΑΔΙΚΗ ΜΕΛΕΤΗ). Αθήνα, Ελλάδα: ICAP.

IMS. (2008). *Ageing well. A healty deal for older citizens of the european union?*

Ioannides-Demos, L. L., Ibrahim, J. E., & McNeil, J. J. (2002). Reference-based pricing schemes: Effect on pharmaceutical expenditure, resource utilisation and health outcomes. *PharmacoEconomics, 20*(9), 577-591.

Jacobzone, S. (2000). *Pharmaceutical policies in OECD countries: Reconciling social and industrial goals* No. OECD Labour Market and Social Policy Occasional Papers). Paris, France: Organisation for Economic Co-operation and Development.

Jansen, P. (2002). *Pricing of pharmaceuticals in the netherlands*. Netherlands:

Jones, A. (2000). Health econometrics. In A. C. Culyer, & J. P. Newhouse (Eds.), *Handbook of health economics* (pp. 265-346). Amsterdam, Netherlands: Elsevier North-Holland.

Jonsson, B. (1994). Pricing and reimbursement of pharmaceuticals in sweden. *PharmacoEconomics, 6 Suppl 1*, 51-60.

Juerges, H. (2007a). *Health inequalities by education, income and wealth: A comparison of 11 european countries and the US* No. 140-2007). Mannheim Research Institute for the Economics of Aging:

Juerges, H. (2007b). *Health insurance status and physician-induced demand for medical services in germany: New evidence from combined district and individual level data* No. SOEPpapers 8). Berlin:

Juerges, H. (2007c). True health vs response styles: Exploring cross-country differences in self-reported health. *Health Economics, 16*, 163-178.

Karokis, A., Christodoulopoulou, A., Tsiaras, T., & Mossialos, E. (2000). Pharmaceutical price controls and positive drug list effects on total and social insurace pharmaceutical expenditure. Amsterdam.

Kennedy, T., McCabe, C., Struthers, G., Sinclair, H., Chakravaty, K., Bax, D., et al. (2005). BSR guidelines on standards of care for persons with rheumatoid arthritis. *Rheumatology, 44*(4), 553-556.

Klazinga, N. (2008). . New York: The Commenwealth Fund.

Klick, J., & Stratmann, T. (2006). *How sensitive are seniors to the price of prescription drugs?* (Florida State University College of Law ed.)

Konijn, P. (2007). *Pharmaceutical products- comparative price levels in 33 european countries in 2005* No. Statistics in Focus, Economy and Finance, Eurostat, 45/2007)

Kontozamanis, V. (2001). *The greek pharmaceutical market* No. 185). Athens,Greece (in Greek): Foundation for Industrial and Economic Research.

Kooiker, S., & van der Wijst, L. (2003). *Europeans and their medicines: A cultural approach to the utilization of pharmaceuticals.* Social Cultural Planning Office of the Netherlands, GfK Panelservices Benelux.:

Kousoulakou, H., & Fragoulakis, V. (2004). *Pharmaceutical market in greece*. Athens; Greece: Foundation for Economics and Industrial Research (IOBE).

Κουσουλάκου, Χ., & Βίτσου, Ε. (2008). *Η Αγορά του Φαρμάκου στην Ελλάδα* Νο. Ετήσια Έκθεση 2008). Αθήνα, Ελλάδα:

Lacro, J., Dunn, L., Dolder, C., Leckband, S., & Jeste, D. (2002). Prevalence of and risk factors for medication nonadherence in patients with schizophrenia: A comprehensive review of recent literature. *Journal of Clinical Psychiatry, 63*, 892-909.

Lexchin, J., & Grootendorst, P. (2004). Effects of prescription drug user fees on drug and health services use and on health status in vulnerable populations: A sytematic review of the evidence. *International Journal of Health Services, 34*(1), 101-122.

Liaropoulos, L., Siskou, O., Kaitelidou, D., Theodorou, M., & Katostaras, T. (2008). Informal payments in public hospitals in greece. *Health Policy, 87*(1), 72-81.

Lichtenberg, F., & Sun, S. (2007). The impact of medicare part D on prescription drug use by the elderly: Evidence from a large retail pharmacy chain. CESifo Conference Centre, Munich.

Lopez Batista, J., & Mossialos, E. (2000). Pharmaceutical expenditure in spain: Cost and control. *International Journal of Health Services, 30*(3), 597-616.

Lopez-Casasnovas, G., & Puig-Junoy, J. (2000). Review of the literature on reference pricing. *Health Policy, 54*(2), 87-123.

Lundkvist, J., Akerlind, I., Borgquist, L., & Molstad, S. (2002). The more time spent on listening, the less time spent on prescribing antibiotics in general practice. *Family Practice, 19*(6), 638-640.

Madden, D., Nolan, A., & Nolan, B. (2005). GP reimbursement and visiting bahaviour in ireland. *Health Economics, 14*, 1047-1060.

Manning, W. (1998). The logged dependent variable, heteroscedasticity, and the retransformation problem. *Journal of Health Economics, 17*(3), 283-295.

Manning, W., & Mullahy, J. (2001). Estimating log models: To transform or not to transform? *Journal of Health Economics, 20*, 461-494.

Manning, W., Newhouse, J., Duan, N., Keeler, E. B., Lelbowitz, A., & Marquis, M. S. (1987). Health insurance and the demand for medical care: Evidence from a randomized experiment. *American Economic Review, 77*(3), 251.

Marchant, N. (1997). *Drivers of the growth in medicines expenditure*

. London,UK: Office of Health Economics.

Martini, N., Gallo, P. F., & Montilla, S. (2007). *PPRI pharma profile italy*. Austria: WHO Regional Office for Europe.

Maurer, J. (2007). *Socioeconomic and health determinants of health care utilization among eldelry europeans: A semiparametric assessment of equity, intensity and responsiveness for ten european countries* No. 144-2007). Mannheim Research Institute for the Economics of Aging:

Maurer, J. (2008). Assessing horizontal equity in medication treatment among elderly mexicans: Which socioeconomic determinants matter most? *Health Economics, 17*(10), 1153-1170.

Morgan, S. G., Agnew, J. D., & Barer, M. L. (2004). Seniors' prescription drug cost inflation and cost containment: Evidence from british columbia. *Health policy (Amsterdam, Netherlands), 68*(3), 299-307.

Mossialos, E., Allin, S., & Davaki, K. (2005). Analysing the greek health system: A tale of fragmentation and inertia. *Health Economics, 14*(S), 151-168.

Mossialos, E., Brogan, D., & Walley, T. (2006). Pharmaceutical pricing in europe: Weighing up the options. *International Social Security Review, 59*(3), 25.

Mossialos, E., Mrazek, M., & Walley, T. (Eds.). (2004). *Regulating pharmaceuticals in europe: Striving for efficiency, equity and quality*. Berkshire, England: Open University Press.

Mrazek, M., & Mossialos, E. (2004). Regulating pharmaceutical prices in the european union. In E. Mossialos, M. Mrazek & T. Walley (Eds.), *Regulating pharmaceuticals in europe: Striving for efficiency, equity and quality* (European Observatory on Health Systems and Policies Series ed., pp. 136-151). England, UK: Open University Press.

Mrazek, M. F. (2002). Comparative approaches to pharmaceutical price regulation in the european union. *Croatian medical journal, 43*(4), 453-461.

Mullahy, J. (1998). Much ado about two: Reconsidering retransformation and the two-part model in health econometrics. *Journal of Health Economics, 17*, 247-281.

Murray, M. D., Morrow, D. G., Weiner, M., Clark, D. O., Tu, W., Deer, M. M., et al. (2003). A conceptual framework to study medication adherence in older adults. *The American Journal of Geriatric Pharmacotherapy, 2*(1), 36-43.

NICE Clinical Guidance No.34. (2006). *Hypertension: Management of hypertension in primary care*

NICE Technology Appraisal No.27. (2001). *Osteoarthritis and rheumatoid arthritis- cox II inhibitors: Guidance*

NICE Technology Appraisal No.94. (2006). *Statins for the prevention of cardiovascular events*

Noyce, P. R., Huttin, C., Atella, V., Brenner, G., Haaijer-Ruskamp, F., Hedvall, M., et al. (2000). The cost of prescription medicines to patients. *Health Policy, 52*, 129-145.

O'Donnell, O., van Doorslaer, E., P. Ranna-Eliya, R., Somanathan, A., Raj Adhikari, S., Akkazieva, B., et al. (2008). Who pays for health care in asia? *Journal of Health Economics, 27*, 460-475.

O'Donnell, O., van Doorslaer, E., Wagstaff, A., & Lindelow, M. (2008). *Analyzing health equity using household survey data : A guide to techniques and their implementation*

OECD. (2004,). Http://www.oecd.org/dataoecd/48/18/18598721.pdf.

OECD. (2007). *Health at a glance 2007: OECD indicators* No. ISBN 9264027327)

OECD. (2008). *Pharmaceutical pricing policies in a global market*. Paris: OECD.

OECD Health Data, 2. (2008).

Office of Fair Trading. (2007). *Annexe K: International survey of pharmaceutical pricing and reimbursement schemes*

Okumo, J., Yanagi, H., & Tomura, S. (2001). Is cognitive impairment a risk factor for poor compliance among japanese elderly in the community? *European Journal of Clinical Pharmacology, 57*, 589-594.

Osterberg, L., & Blaschke, T. (2005). Adherence to medication. *New England Journal of Medicine, 353*(5), 487-497.

Paris, V., & Docteur, E. (2007). *Pharmaceutical pricing and reimbursement policies in switzerland* No. No. 27). Paris, France: Directorate for Employment, Labour and Social Affairs, Health Commettee.

Paterson, I., Fink, M., & Ogus, A. (2003). *Economic impact of regulation in the field of liberal professions in different member states* No. Study for the European Commission, DG Competition)

Pauly, M. V. (1968). The economics of moral hazard: Comment. *American Economic Review, 58*(3), 513-517.

Peura, S., Rajaniemi, S., & Kurkijärvi, U. (2007). *Pharmaceutical pricing and reimbursement information project- pharma profile: Finland*. Austria: Austrian Ministry of Health, Family and Youth.

Peytremann-Bridevaux, I., & Chevrou-Severac, H. (2008). Financial burden of medical care and risk of forgoing care among europeans with depressive symptoms. *Psychiatric Services, 59*(8), 840-842.

Rosman, S., Le Vaillant, M., Schellevis, F., Clerc, P., Verheij, R., & Pelletier-Fleury, N. (2008). Prescribing patterns for upper respiratory tract infections in general practice in france and in the netherlands. *The European Journal of Public Health, 18*(3), 312-316.

Rozenfeld, Y., Hunt, J., Plauschinat, C., & Wong, K. (2003). Oral antidiabetic medication adherence and glycemic control in managed care. *The American Journal of Managed Care, 14*(2), 71-75.

Rubin, R. R., Peyrot, M., & Siminerio, L. (2006). Results of the cross-national diabetes attitudes, wishes and needs (DAWN) study. *Diabetes Care, 29*(6), 1249-1255.

Sacco, R., Adams, R., Albers, G., & et al. (2006). Guidelines for the prevention of stroke in patients with ischemic stroke or transient ischemic attack: A statement for healthcare professionals from the american heart Association/American stroke association council on stroke. *Stroke, 37*(2), 577-617.

Schaumans, C., & Verboven, F. (2006). *Entry and regulation- evidence from health care professions* No. Center for Economics Studies Discussions Paper Series (DPS))

Scottish Intercollegiate Guidelines Network (SIGN). (2008). British guideline on the management of asthma. A national clinical guideline.

Sen, A. (2002). Health: Perception versus observation. *British Medical Journal, 324*, 860-861.

Shang, B., & Goldman, D. P. (2007). Prescription drub coverage and elderly medicare spending. *NBER Working Paper 13358,*

Silvio, G. (1998). The drug market in four european countries. *Pharmacoeconomics, 14*(Supp. 1), 69-79.

Siskou, O., Kaitelidou, D., Papakonstantinou, V., & Liaropoulos, L. (2008). Private health expenditure in the greek health care system: Where the truth ends and the myth begins. *Health Policy, 88*, 282-293.

Smith, S., Allen, J., Blair, S., & et al. (2006). AHA/ACC guidelines for secondary prevention for patients with coronary and other atherosclerotic vascular disease: 2006 update: Endorsed by the national heart, lung, and blood institute. *Circulation, 113*(19), 2363-2372.

Stilley, C., Sereika, S., Muldoon, M., Ryan, C., & Dunbar-Jacob, J. (2004). Psychological and cognitive function: Predictors of adherence with cholesterol lowering treatment. *Annals of Behavioral Medicine, 27*(2), 117-124.

Strandberg-Larsen, M., Bernt Nielsen, M., Vallgarda, S., Krasnik, A., & Vrangbaek, K. (2007). Denmark: Health system review. *Health Systems in Transition, 9*(6), 1-164.

Street, A., Jones, A., & Furuta, A. (1999). Cost-sharing and pharmaceutical utilisation and expenditure in russia. *Journal of health economics, 18*(4), 459-472.

Sturm, H., Austvoll-Dahlgren, A., Aaserud, M., Oxman, A., Ramsay, C., Vernby, A., et al. (2007). Pharmaceutical policies: Effects of financial incentives for prescribers. *Cochrane Database of Systematic Reviews,* (3)

Sun, X., Jackson, S., Carmichael, G., & Sleigh, A. (2008). Catastrophic medical payment and financial protection in rural china: Evidence from the new cooperative medical scheme in shandong province. *Health Economics, 18*, 103-119.

Teixeira, I., & Vieira, I. (2008). *Pharmaceutical pricing and reimbursement information-pharma profile: Portugal*. Austria: Gesundheit Österreich GmbH.

Thiebaud, P., Patel, B. V., & Nichol, M. B. (2008). The demand for statin: The effect of copay on utilization and compliance. *Health Economics, 17*, 83-97.

Thomson, S., Foubister, T., & Mossialos, E. (2008). *Health care financing in the context of social security* No. IP/A/EMPL/ST/2006-208). Brussels: European Parliamet's Commettee on Employment and Social Affairs (EMPL).

Tolonen, H., Keil, U., Ferrio, M., Evans, A., & for the WHO MONICA Project. (2005). Prevalence, awareness and treatment of hypercholesterolaemia in 32 populations: Results from the WHO MONICA project. *International Journal of Epidemiology, 34*, 181-192.

Tragakis, E., & Polyzos, N. (1996a). *Health care systems in transition- greece*. Copenhagen: World Health Organization Regional Office for Europe.

Tragakis, E., & Polyzos, N. (1996b). *Health care systems in transition: Greece*. Copenhagen: European Observatory on Health Care Systems.

Tuncay, R., Eksioglu, E., Cakir, B., Gurcay, E., & Cakci, A. (2007). Factors affecting drug treatment compliance in patients with rheumatoid arthritis. *Rheumatology International, 27*(8), 743-746.

Van de Voorde, C., van Doorslaer, E., & Schokkaert, E. (2001). Effects of cost sharing on physician utilization under favourable conditions for supplier-induced demand. *Health Economics, 10*, 457-471.

van Doorslaer, E. (1984). The effects of cost sharing on the demand for prescription drugs in belgium. *Acta Hospitalia, 3*, 69-81.

van Doorslaer, E., O'Donnell, O., Ranan-Eliya, R., Somanathan, A., Adhikari, S., Garg, C., et al. (2007). Catastrophic payments for health care in asia. *Health Economics, 16*, 1159-1184.

van Ganse, E., Chamba, G., Bruet, G., Becquart, V., & Stamm, C. (2007). *Pharmaceutical prising and reimbursement information* No. PPRI Pharma Profile France). Austria: WHO Regional Office for Europe, Gesundheit Osterreich GmbH.

Van Tielen, R., Peys, F., & Genaert, J. (1998). The demographic impact on ambulatory pharmaceutical expenditure in belgium. *Health policy (Amsterdam, Netherlands), 45*(1), 1-14.

Van Vliet, R. (2001). Effects of price and deductibles on medical care, demand, estimated from survey data. *Applied Economics, 33*(12), 1515-1524.

Vardica, A., & Kontozamanis, V. (2007). *Pharma profile: Greece*. Austria: Gesundheit Osterreich GmbH/ Geschaftsbereich OBIG.

Vermeire, P., Rabe, K., Soriano, J., & Maier, W. (2002). Asthma control and differences in management practices across seven european countries. *Respiratory Medicine, 96*(3), 142-149.

Volker, U., & Eberhard, W. (1996). Healthcare reform and expenditure on drugs the german situation. [Electronic version]. *Pharmacoeconomics, 10*(Suppl.2), 81-88.

Vrangbaek, K. (2008). *The health system in denmark*. New York: The Commenwealth Fund.

Wagstaff, A., & van Doorslaer, E. (1992). Equity in the finance of health care: Some international comparisons. *Journal of Health Economics, 11*, 361-387.

Wagstaff, A., & van Doorslaer, E. (2000). Measuring and testing for inequity in the delivery of health care. *Journal of Human Resources, 35*(4), 716.

Wagstaff, A., & van Doorslaer, E. (2003). Catastrophe and impoverishment in paying for health care: With applications to vietnam 1993-1998. *Health Economics, 12*, 921-934.

Wagstaff, A., van Doorslaer, E., van der Burg, H., Calogne, S., Christiansen, T., Citoni, G., et al. (1999). Equity in the finance of health care: Some further international comparisons. *Journal of Health Economics, 18*, 263-290.

Wagstaff, A., van Doorslaer, E., & Watanabe, N. (2003). On decomposing the causes of health sector inequalities with an application to malnutrition inequalities in vietnam. *Journal of Econometrics, 112*(1), 207.

Watkins, C., Harvey, I., Carthy, P., Moore, L., Robinson, E., & Brawn, R. (2003). Attitudes and behaviour of general practitioners and their prescribing costs: A national cross sectional survey. *Qual.Saf.Health.Care., 12*(1), 29-34.

Whitehead, M., & Dahlgren, D. (2007). *Concepts and principles for tackling social inequities in health: Levelling up part 1.* No. (Studies on social and economic determinants of population health, No.2)). Copenhagen:

Windmeijer, F., de Laat, E., Douven, R., & Mot, E. (2006). Pharmaceutical promotion and GP prescription behaviour. *Health Economics, 15*(1), 5-18.

Winkelmann, R. (2004). Co-payments for prescription drugs and the demand for doctor visits--evidence from a natural experiment. *Health economics, 13*(11), 1081-1089.

Xu, K., Evans, D. B., Kawabata, K., Zeramdini, R., Klavus, J., & Murray, C. J. (2003). Household catastrophic health expenditure: A multicountry analysis. *Lancet, 362*(9378), 111-117.

ΕΣΥΕ. (2007).

Εφημερίς της Κυβερνήσεως, Νόμος υπ' αριθ. 3457, Μεταρρύθμιση του Συστήματος Φαρμακευτικής Περίθαλψης, (2006).

Κουσουλάκου, Χ. (2004). *Η Αγορά του Φαρμάκου στην Ελλάδα*. Αθήνα, Ελλάδα: Ίδρυμα Οικονομικών & Βιομηχανικών Ερευνών.

Λοπαντατζίδης, Α., Χατζηανδρέου, Ε., & Νεκράριος, Μ. (2001). *Αποτίμηση της αποτελεσματικότητας της Θετικής Λίστας Φαρμάκων στην Συνταγογράφηση στην Ελλάδα*. Αθήνα, Ελλάδα: Ίδρυμα Κοινωνικών Ασφαλίσεων.

Ματσαγγάνης, Μ., Τσακλόγλου, Π., & Μητράκος, Θ. (2001). *Ιδιωτική δαπάνη υγείας και ιδιωτική ασφάλιση στην Ελλάδα* No. INTERAMERICAN)

Σουλιώτης, Κ. (2002). Ανάλυση των δαπανών υγείας στην Ελλάδα 1989- 2000. Μεθοδολογικές Διευκρινίσεις και διαπιστώσεις για το Σύστημα Υγείας. In Κ. Σουλιώτης, & Γ. Κυριόπουλος (Eds.), *Οι δαπάνες υγείας στην Ελλάδα. Μεθοδολογικά προβλήματα στη μέτρηση και συνέπειες για τις πολιτικές υγείας* (). Αθήνα, Ελλάδα: Εκδόσεις Παπαζήση.

Τερζή, Γ. (1999). Συγκριτική παρουσίαση των πολιτικών ελέγχου των φαρμακευτικών δαπανών στις χώρες της Ευρωπαικής Ένωσης. In Μ. Γείτονα, & Γ. Κυριόπουλος (Eds.), *Πολιτική και Οικονομία του Φαρμάκου στην Ελλάδα* (pp. 64-88). Αθήνα: Θεμέλιο.

Τούντας, Γ. (2008). *Οι Υπηρεσίες Υγείας στην Ελλάδα 1996-2006*. Αθήνα, Ελλάδα: Κέντρο Μελετών Υπηρεσιών Υγείας, Εργαστήριο Υγιεινής και Επιδημιολογίας Ιατρικής Σχολής Πανεπιστημίου Αθηνών.