Erasmus University Rotterdam
Erasmus School of Economics

Financial Burden of Drug Expenditures in Poland

Supervisor: Prof. Eddy van Doorslaer

Name: Julita Łuczak

Student Number: 326173al

e-mail address: julita.luczak@gmail.com

June 2010

Abstract

The thesis investigates catastrophic and impoverishing out-of-pocket payments for pharmaceuticals in Poland. This is an interesting issue especially because the country's inhabitants incur extensive drug expenditures, both as a result of high co-payment level as well as of incredibly popular OTC medicines. First of the investigated approaches assumes that OOP expenditures should not exceed a threshold, which is set at a chosen fraction of income. Second approach takes into account payments that cause "new" or deepen the existing poverty. We find that the incidence and intensity of catastrophic drug expenditures increased over years and that the poor are more likely to incur them. As for the impoverishment approach, we find that pharmaceutical spending do have an influence on the poverty level, however it is higher when we consider relative poverty line than when we analyze poverty in absolute terms. What is interesting, it seems that poverty caused by drug expenditure is very stable across years. Similar procedure, conducted on the sub-sample of retired an chronically ill people brings higher results for both approaches.

Acknowledgements

I would like to gratefully thank my supervisors, Eddy van Doorslaer and Pilar Garcia Gomez for allowing me to work with them on the chosen subject area. Special thanks to Pilar for her great help and patience, as well as for fast, effective and helpful e-mails.

I would like to thank my Mom for her love and invaluable support, and my Dad, for his support, precious suggestions about the thesis as well as for the sponsorship.

Special thanks to M. Nyga for his love, support and knowledge, which helped me getting through the difficulties during studies in the Netherlands.

Table of Contents

1. Introduction

" I will lift mine eyes unto the pills. Almost everyone takes them, from the humble aspirin to the multi-colored, king-sized three deckers, which put you to sleep, wake you up, stimulate and soothe you all in one. It is an age of pills…"

~ Malcolm Muggeridge, 1962

It is hard not to notice that nowadays societies attach greater significance to the health matters than some time before. The healthy lifestyle is being spread among the world as an attractive fashion, which makes people care more about enhancing the quality of their lives. Moreover, growth and ageing of populations, together with growing expectations concerning attainable health and a common access to health care result in a significant rise in the demand for health care. Increasing complexity of medical services, which also keep widening in range, as well as development of new medical technologies require enlarged financial resources, to be provided by both the state and individuals. The range and structure of public and private financing in a country is directly associated with the current health system.

There is one type of health spending that absorbs the large part of resources, namely pharmaceutical expenditure. Former European Union countries (EU 15) spend on drugs on average 15% of total health expenditure, whilst in the new EU states (Poland, Slovakia, Czech Republic and Hungary), medicines expenditure accounts for around 26% of total health expenditure[1]. Lengthening of the average lifespan, developing prevention of age-related and civilization diseases, as well as advanced research which invents new treatments and breakthrough medicines – all of these phenomena create a long list of mechanisms which stimulate the demand for drugs.

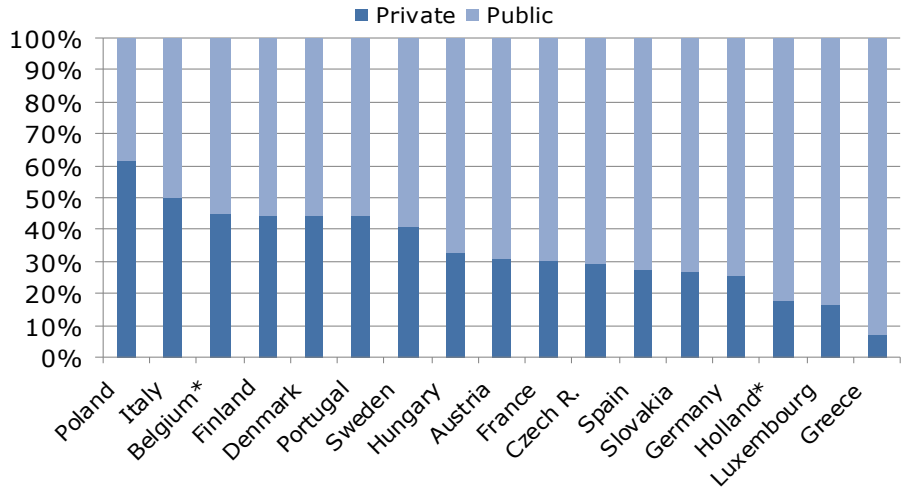
The cost of pharmaceutical products is an important component of health expenditure, however its burden on health care systems varies widely across countries and depends highly on the individual policy of the country. Drug

[1] Health for all database, WHO 2007

expenditures are incurred by both the health sector's budget as well as directly by households, thus the proportion of public to private drugs financing indicates whether the burden is imposed on individuals or on the state.

Figure 1 gives an overview of a structure of pharmaceutical expenditure in Europe in 2006. What is interesting, Poland is the only country, in which private drug expenditures exceed the public medicines spending and account for 61% of the total pharmaceutical expenditures. Comparable in terms of a level of development countries, like Czech Republic or Slovakia, characterize with much lower share of the private drug expenditures.

Figure 1. Share of public and private expenditures in total pharmaceutical expenditures, 2006

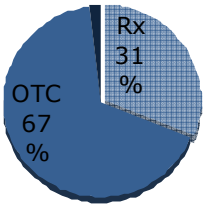


*Source: OECD Heath Data 2008, *WHO HFA database*

Private expenditures on drugs comprise of out-of-pocket spending in 98% (CSO, 2008). Therefore, almost 61% of the total drug spending in Poland comes out of patients' pockets. What is more, according to the Central Statistical Office (CSO), drugs in Poland are used very commonly. During 2006 only a 2% fraction of the investigated representative sample of households did not buy any medicines. According to CSO's report from 2007, throughout last years there has been a constant growth of pharmaceuticals' consumption. This increase has involved especially Over The Counter (OTC) drugs, but also the prescription medicines (Rx) (CSO, 2007). High share of private spending in total pharmaceutical expenditures has two main reasons. First of all, Poland characterizes with a high level of co-

payment for prescribed drugs, which accounts for 33,5%[2]. According to WHO, co-payment level of more than 25% can seriously limit the access to medicines, especially among groups that are economically weaker and groups which use the pharmaceuticals on a higher scale, like retired or people chronically ill (MZ 2004).

Figure 2. OOP expenditures on pharmaceuticals, 2006

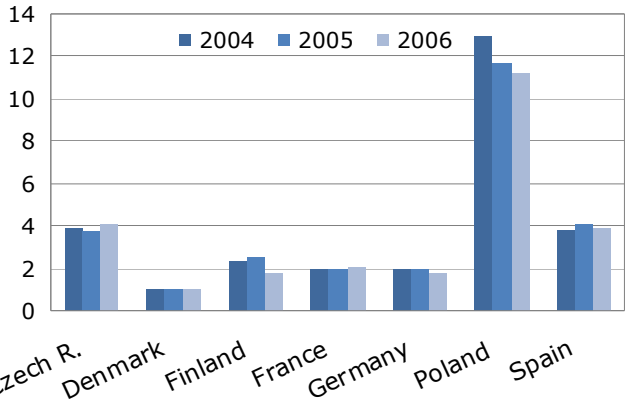


Source: OECD Heath Data 2008

The high level of co-payment might partially explain such considerable differences in the level of private spending on pharmaceuticals between countries. At the same time, we can see that it is the OTC drugs share that accounts for 67% of all OOP expenditures on pharmaceuticals (figure 2). Prescription medicines (Rx) absorb 31%. Figure 3 shows that OTC drug expenditures account for as much as 11-12% of total health expenditures in Poland, whilst in other European countries oscillate around 2-4%.

In terms of size of the pharmaceutical market, Poland is the sixth country in Europe (UOKIK, 2006). Consumption of OTC drugs places Poland on the fifth position among European states, whilst in terms of just the "painkillers" usage, the country is third in the world, behind USA and France (Wprost24, 2007).

Figure 3. Share of OTC drugs expenditures in total health expenditures, 2006



Source: OECD Heath Data 2008

This kind of a mass phenomenon might lead to the conclusion that the society is either very unhealthy or that it developed kind of a specific "culture" of taking drugs. High share of expenditures on OTC pharmaceuticals shows that people often do not consult a doctor before starting a medical treatment. There are opinions that

[2] According to PharmaExpert, level of co-payment in January 2010 was 28,5%

in Poland there is an excessive and unreasonable consumption of pharmaceuticals, especially the painkillers.

It is hard to investigate factors like irrationality of taking drugs, thus this will not be the subject of this research. In this study we will focus on the financial burden of drug expenditures (OTC and Rx) on the whole population of Poland as well as on the economically weaker groups of the society. Similar to Van Doorslaer and Wagstaff (2003), we will look into the catastrophic and impoverishing out-of-pocket spending on pharmaceuticals amongst households in Poland. In the catastrophic approach we examine whether and to what extent drug OOP payments' share in income exceed the pre-specified fraction of income. Expenditures are considered catastrophic if their share in income surpasses the chosen thresholds. Impoverishment approach assumes that households should not incur health costs which push them into poverty or worsen the poverty they have already experienced. In order to investigate this issue, we set two poverty lines and examine the incidence and intensity of poverty looking at the pre-payment and post-payment income. The two approaches will be applied to the whole sample as well as to the representative sub-sample of just the retired and chronically ill people. This will allow us to see, whether this group is more exposed to catastrophic or impoverishing influence of OOP expenditures.

The data we use comes from a survey conducted on a representative sample of Polish households and is available for 2000, 2003, 2005, 2007 and 2009. The analysis of data provides us with an insight of the situation in Polish households across almost 10 years and allows for a deep investigation of matters interesting in terms of the study. We study how changes in health care system during the period in question influence the households' situation. We are interested in the general trends in income and out-of-pocket pharmaceutical expenditures as well as in the impact of catastrophic and impoverishing payments for drugs. Finally, we also investigate how many individuals resigns of medical therapy because of its cost.

The thesis is structured as follows: the following chapter presents literature review. The subsequent section introduces the Polish reality to the reader. After presenting some demographical data and statistics, the historical background of the health

system and its implications to the formation of the current policy are briefly explained. The last subsection will present relevant features about the drug policy, especially the rules of co-payment in financing the pharmaceuticals. Moreover, we present the data which explains why it is interesting to look at the OOP drugs expenditures instead of OOP expenditures as a whole. Third section of the thesis is the empirical part, where we will take a closer look at the methodology, data specification, and present, as well as analyze results of the research in terms of the catastrophic and impoverishing payments for drugs. A similar procedure will be conducted for the sub-sample of retired and chronically ill individuals to investigate, whether in fact the catastrophic and impoverishing medication expenditures are more concentrated and problematic among them. This section will also provide answer to the question of how many individuals do not buy prescribed drugs because of their cost. Finally, the fourth section offers the conclusion.

2. Literature review

There is a large literature that investigates the financial burden of out-of-pocket payments using catastrophic and/or impoverishment measures, however most publications focus on private out-of-pocket health spending as a whole, without drug expenditures distinction.

This thesis base on methodology and construction of a paper by Van Doorslaer and Wagstaff (2003), which introduces two threshold approaches for measuring equity of health expenses and examines catastrophic and impoverishing out-of-pocket payments for health in Vietnam in 1993 and 1998. In the country where eighty percent of health expenditure was in 1998 spent out-of-pocket, authors discover that all the measures for incidence and intensity, as well as the concentration of catastrophic health expenditures among poor declined during the period in question. Impoverishment caused by health expenses was found to mostly influence people already being poor. Impact of the catastrophic health spending on other Asian countries was investigated by van Doorslaer, O'Donnell, Rannan-Eliya, et al. (2007).

The catastrophic approach can be found in early papers of Berki and Wyszewianski (1986), where authors take a look at the incidence of catastrophic out-of-pocket health expenditures incurred by households in America in 1977. Thresholds are set at 5%, 10% and 20% of the household income. In that time, almost 20% of American households were incurring health expenses above 5% of their income, whilst 9,6% of this group were exceeding 10% threshold. The catastrophic expenditure of more than 20% of the household income was experienced in 4,3% of households. Merlis (2002) looks at the same issue in America, but a few years later. He finds that 20% families in 1987 and 16,3% families in 1996 spent OOP on health more than 5% of their income. The share of families incurring medical costs of more than 10% of income was 10% in 1987 and 7,4% in 1996. Thus, at both thresholds the problem of catastrophe in health spending has lessened during the investigated decade. The author finds also that low income households are more exposed to the catastrophic expenditures. Almost a quarter of American families with income below poverty line experienced OOP expenses of more than 5% of their income. Also elderly are more at risk of incurring too high medical costs. Desmond, Rice, et al. (2007) investigate the problem of catastrophic OOP health spending looking at the older and younger adults in the United States. Authors find that people aged 65 and above spend considerably more than younger individuals. On average, older inhabitants spend out-of-pocket 10% of their income on health care, plus around 3% on prescription drugs, whilst people under 65 devote only 2% of their earnings on health care and around 0,5% on Rx medicines.

Xu, Kewans, et. al. (2003) conducted a research in which 59 countries were investigated in terms of catastrophic health care payments (Poland was not included). As expected, the highest rates were found among countries in transition – Ukraine, Vietnam, Cambodia, Azerbaijan as well as among Latin American countries. Authors note that middle-income and low-income as well as mentioned above economies in transition are more likely to incur catastrophic health care costs.

The evidence on the catastrophic and/or impoverishing effect of pharmaceutical expenditures is scarcer. Whitehead (2001) notes the phenomena of irrational drug using and prescribing in low-income countries. He also identifies exaggerated in

some countries out-of-pocket drug payments as a direct factor leading to the medical poverty trap. Besides impoverishing impact, excessive and irrational medications prescribing and consumption, has dangerous health consequences.
Xu K., Saksena P., Carrin G., et. al. (2009) looked at the catastrophic health expenditure in Lithuania and found that it was mostly driven by expenditures on drugs. The catastrophic threshold was set at 40% of the non-subsistence expenditure. Although the incidence of catastrophic OOP drug expenditures was evident in all income groups, it was the most significant in the lowest quintile and accounted for 5,8% of households.

Suchecka and Laskowska (2008) investigate inequities in out-of-pocket health care financing in Poland in 1996,1999, 2001 and 2006 using measures of concentration and economic distance between different sub-populations. The investigated period refers to the time before the reform of the health system (1996), duration of the sickness funds system (1999 year, which introduced universal insurance, and the year 2001), and the duration of the National Health Fund (2006). Authors find that during the whole period, Gini index for medical articles exceeded the one for income. Over the years, income inequality was falling. Introduction of the universal health insurance in 1999 resulted in a slight relaxation of the existing in 1996 inequality in drug spending. In 2001 the Gini coefficient fell from 39% to 36,2% to reach 38% in 2006.
In order to determine the differences in funding, and thus access to medical benefits between socio-economic groups, a coefficient of Dagum's economic distance D_0 is used. This indicator measures proportions in which one population dominates over other comparable populations. The economic distance D_0 is defined as the probability that the value of health expenditure for one population is higher than for the other (without taking into account the size of this difference). Economic distance D_0 shows large variation in the level of expenditure between households of pensioners and other households. Authors find that calculated values of the Dagum's economic distance indicate that there is a higher probability for pensioners households to spend more on pharmaceuticals in comparison to any other socio-economic group. Moreover, this dispersion increased further in 2006,

which means that high financial burden of drug spending on the group of retired and chronically ill people deepened after introducing a new health system (National Health Fund, see chapter 2).

The thesis purposes in identifying to what extent medicine expenditures are a financial burden for households in Poland. As far as I am concerned, this phenomena has not been thoroughly investigated yet. This is interesting as the scale of the problem of high and sometimes exorbitant pharmaceutical expenditures is rather uncommon.

3. Polish health care system

3.1. Basic facts about Poland

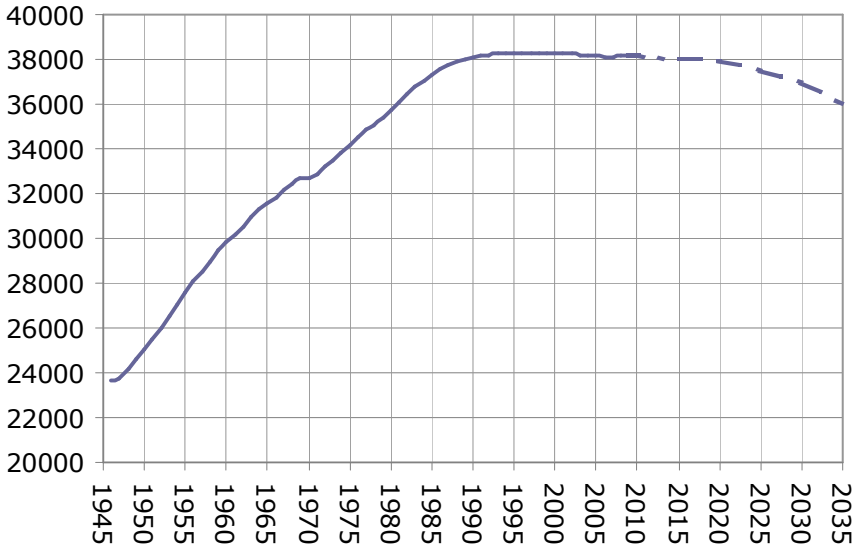
The Republic of Poland has a rich historical background. The country, torn by the wars, whose territory was many times divided and attached to surrounding states, after the Second World War ended up as a central planned economy under a close supervision of the Soviet Union. In 1989 Poland began a historical breakthrough, which ended a 44 years period of communist rule in the country, and in effect led other central and south-eastern European countries to abolish the communism as well. Last 20 years were crucial for Poland, which had to reestablish democracy and turn from central planned to the market-driven economy. Many years of transition allowed for a positive change and development which resulted in joining the European Union in 2004.

The Republic of Poland is located in the central area of the European continent. Not so far from the capitol of the country, Warsaw, lies the geometrical central point of Europe. The territory accounts for 312,683 thousands square kilometers, which places Poland on the ninth position amongst European countries and 63rd in the world.

Population of the country in 2009 accounted for 38149 thousand people. Figure 4 presents the size of the population from 1946 till recent. As we can see, after the continuous increase from the beginning of the period till around 1990, the population growth slowed down and then started decreasing. Although the last 2

years brought a positive population growth, the predictions show that the number of people will keep falling over the next decades. This is indicated as a doted line in the graph.

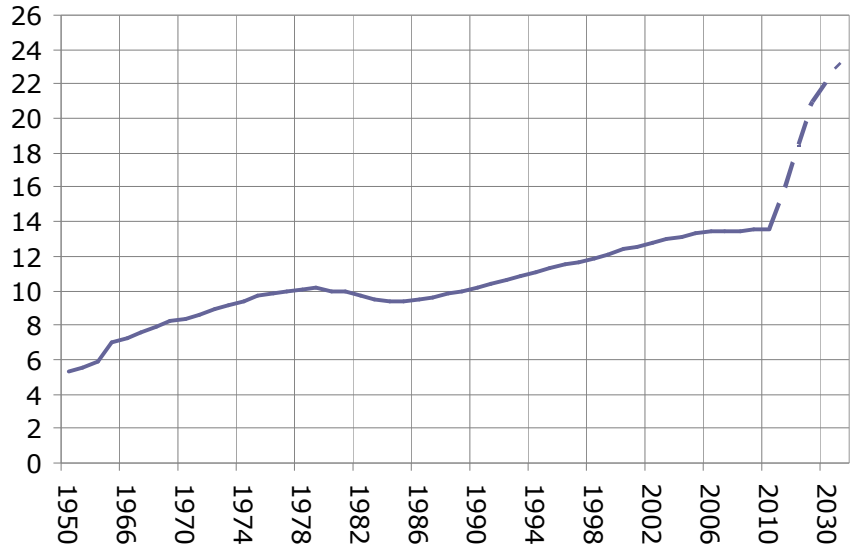
Figure 4. Population of Poland 1946-2009, predictions for 2010-2035 (thousands people)



Source: Central Statistical Office, Demographic Yearbook of Poland, 2009

Generally speaking, Poland follows the overall tendency of most of the European countries, which is the negative population growth. Polish society face the problem of ageing population reflected in increasing number of people over 65 years old. The share of inhabitants aged below 20 in the population total has been systematically decreasing since the middle eighties. In 2004 this group accounted for 24,5%, whilst the population of children aged 0-14 was about 16,7% of the overall population in Poland. At the same time the share of people aged 65 and more was gradually increasing and in 2004 accounted for 13,1% of the Polish population. According to the CSO's prognosis, by 2010 the raise in the elderly population will not be that significant, however, the following years will bring a more considerable increase and the group of people aged 65 up will reach 24% in 2030 (figure 5). This means that almost the fourth Pole will be at least 65 years old (CSO 2009). Therefore, the demand for health care, including drugs, will be rising.

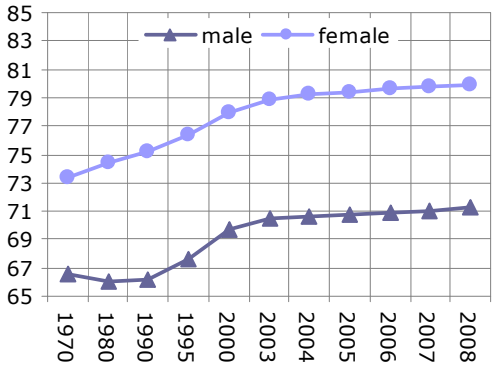
Figure 5. Population of 65 and more in the population total, %



Source: CSO, Demographic Yearbook of Poland, 2009

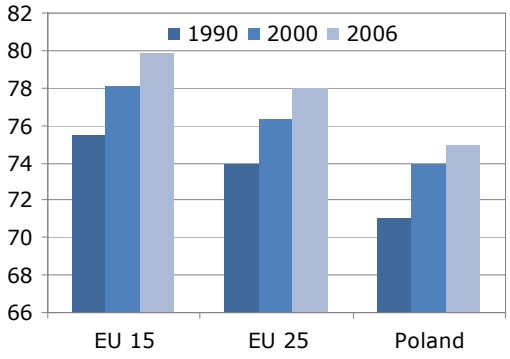
Another indicator that might be found useful in terms of this study is the life expectancy at birth. It allows for the basic assessment of the state of health in the country, as well as for some international comparisons. Over the past 15 years, the average life expectancy at birth increased by 5 years in case of males and by 4,7 years for females. In 2008 the indicator for men accounted for 71,26 years and almost 80 years for women (figure 6).

Figure 6. Life expectancy at birth in Poland.



Source: CSO, Demographic Yearbook, 2009

Figure 7. Life expectancy in the EU.



Source: WHO Statistical Information System

Although there is a considerable increase in the life expectancy rate, Poland is still far behind the European Union. Figure 7 presents the average life expectancies for

both sexes in the "old" European Union of 15 states, the EU 25 and in Poland. Compare to the most developed countries of the EU 15, people in Poland on average live 4-5 years shorter. The difference between Poland and the EU 25 (including Poland) is on average 2-3 years.

After discussing the basic facts about Poland, we now move to describing the health policy and health system financing.

3.2. Health care system transformations.

Before the Second World War Polish health care system based on the Bismarckian social health insurance system. The health insurance was mandatory only for particular groups of jobs, like government professions, whilst some groups were excluded. As a result, this system covered only around 7% of the population. The insurance contributions were paid both by employers and employees and the state did not participate in the financing. Range of the benefit depended on the scale of contribution.

After the Second World War the country ended up as a central planned economy under the Soviet Union's supervision. Therefore, the health system in Poland was derived from the Soviet "Semashko" model. The model was founded in the 30s of the twentieth century and became the foundation for the creation of health systems in the Central and Eastern European countries. Its assumptions were based on the concept of national health service financed by general taxation, and universal access to a wide range of benefits. The state was made responsible for public health whilst health care institutions were funded centrally from the budget. Insurance expenditures were included in the overall financial system, which would ensure that all eligible persons receive benefits, regardless of the amount of inflows from contributions. In 1952, free access to health care for Polish citizens was guaranteed by a constitution, however this did not mean that all social groups were in fact provided with free health services. For example, farmers and their families were granted the right to complimentary treatment only after the reforms, which occurred in 1972. During the eighties, there were some efforts made to

decentralize the health system so that some of the responsibilities would be taken over by the units on the regional (voivodship) or even more local level.
The process of the proper reforming of the healthcare system have started in 1989 together with the profound change of the political and economic system. Transformation of the organization of health care proceeded slowly. At the beginning, the reforms assumed further decentralization, developing frames for the mandatory health insurance and the primary healthcare. They were supposed to enable radical changes in the financial and institutional organization, especially on local levels.
In 1999, the tax funded healthcare was replaced by a conception based on the modified Bismarck model. The mixed financing have been introduced, by adopting a law of a common and mandatory health insurance. The insurance contributions, deducted from the taxation of personal income were pooled and managed by the 16 regional "sickness funds". On the one hand, the law of common health insurance created a new kind of health insurance, which was based on the principles of social solidarity, self-financing, the right of free choice of a doctor and health fund, to ensure equal access to benefits. On the other hand it formed unprofitable regional units, which were not able to coordinate their actions.
Another act came into life in April 2003, where the 16 sickness funds were replaced by the one National Health Fund (NHF). Thus, the system has been re-centralized into one organ with 16 regional divisions and a central office in Warsaw. However, because of a lack of clear definition of the terms and conditions for granting medical benefits, the law was repealed by the decision of the Constitutional Court. Therefore, in October 2004 the government legislated the existing act, the law on health care services dated on August 27th 2004. According to this document the executor of the universal health insurance, NHF, manages the public funds in order to provide the citizens with equal treatment, social solidarity, free access to insured health services and free choice of providers.

Health system transformation did not bring a change in the rules of reimbursement. Both systems assumed division of drugs to essential and complementary medicines, issued based on a prescription; free-of-charge, at a flat fee or at 30%/50% of the drug's price. The main influence of the NHF introduction on pharmaceutical

expenditures was a definite slowdown in the reimbursement dynamics. First of all, establishment of price limit financially forced patients to ask for prescription of cheaper, equivalent generic medicines. At the same time, a large number of pharmaceutical products has been removed from the reimbursement lists. This resulted in a radical drop in public expenditures on reimbursement from year 2004 to 2005. Therefore, had patients not switched to cheaper medications, their payments would have risen very rapidly (Bogusławski 2005).

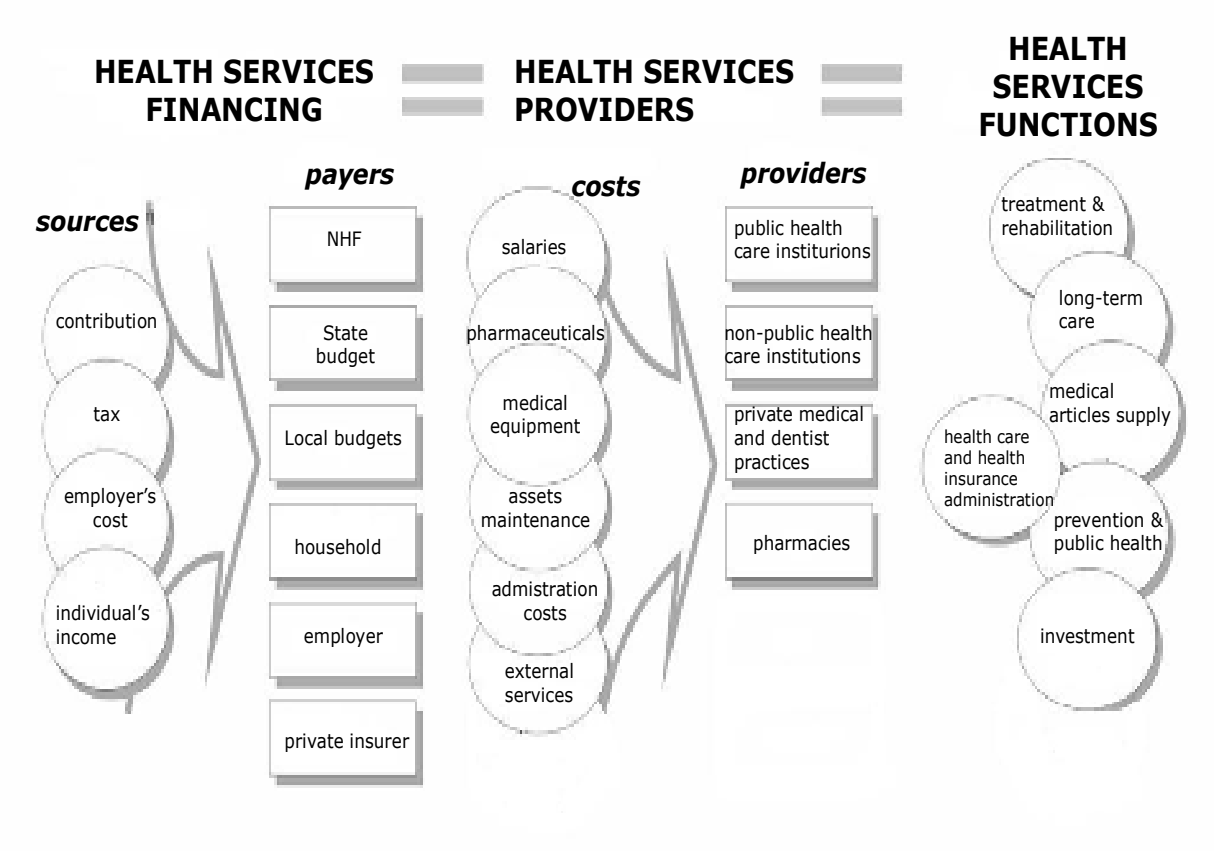
3.3. Health care financing

A comprehensive picture of the health system requires a three-dimensional analysis (Thomson, Foubister and Mossialos, 2009). First of all – a study of the sources and mechanisms to raise funds for health and assessment of current and projected expenditures. Secondly - an analysis of the costs of "producing" health benefits, taking into account their types, changes in the structure and dynamics, as well as the level and methods of funding. Thirdly - analysis of expenditures incurred by all parties in order to meet their health care needs.

This classification is based on three-dimensional, International Classification for Health Accounts - ICHA, which enables simultaneous listing of expenditure on health by:

1) funding sources / payers,
2) suppliers (manufacturers) of goods and services and their costs,
3) functions of these goods and services.

This kind of listing for Poland is presented in the diagram below. In the first column we can see the funding sources which are pooled, managed and distributed by the different payers. The scheme does not talk about the scale and weight of the particular sources which will be discussed later in the chapter. This block includes also the private insurers, however, their participation is slight and their functioning in the health system is not yet regulated in Poland. In the next column we have the providers of the health services and the costs of "hiring" them. Finally, the last column mentions some of the main functions which are supposed to be accomplished by the health system.



Source: Health Care Financing in Poland – the Green Book 2008

For the purpose of this study we will focus on methods of financing and on the range and structure of expenditures[3].

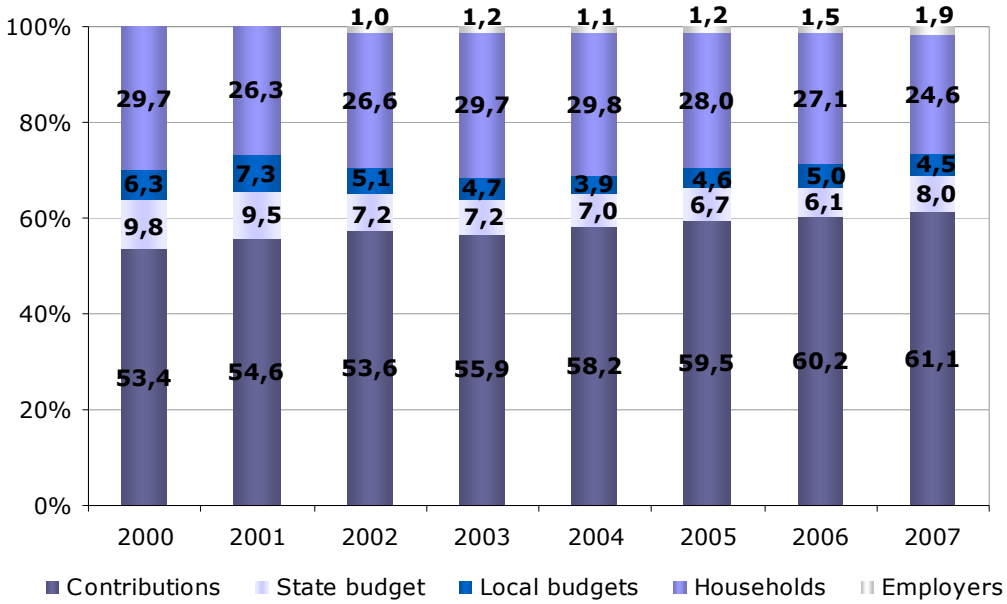
Heath care system in Poland has a few sources of financing. The main one without a doubt comes from the health insurance contributions which are pooled and managed by the National Health Fund. Second source is derived from taxes and is distributed by the state budget as well as by the budgets on local levels. Another important element of health sector revenues are individuals' incomes directly spent on health care through the "out-of-pocket" expenditures.

The share of the described elements of financing can be seen in figure 8. It clearly indicates, that the primary sources are the health contributions and the household's expenditures on health care. Thus the individual's income is influenced by both the contributions and the out-of-pocket spending. The earnings coming from the state

[3] For a more detailed analysis of Polish health system, please refer to, e.g. Kuszewski K, Gericke C (2005). Health systems in transition: Poland, or to the System of Health Accounts data, collected by OECD

as well as the local budgets are very limited. During the last few years there have been an increase in the financing of the employees' health programs from the private sources of the companies. However, this way of funding health services is not very popular and its share in the total sources is not significant. Moreover, it is not formally introduced in Poland yet.

Figure 8. Health sector revenues 2000-2007 in billion Zlotys



Source: Health Care Financing in Poland – the Green Book 2008

Health insurance plays the basic and dominant role in the financing of the Polish health care system. NHF is the main organizational unit which pools and manages the major funds in the system coming from the insurance contributions.

Sources that are pooled by government or local budgets are not a constant or regulated part of the revenues of the health sector. They are formed by changeable regulations coming from the decisions of the central and local authorities. The fact is, that these sources do not focus on the individual's health services, but they cover needs of the population as a whole. By this we mean specific health programs, health education, high-specialized procedures, national investment programs and prevention programs.

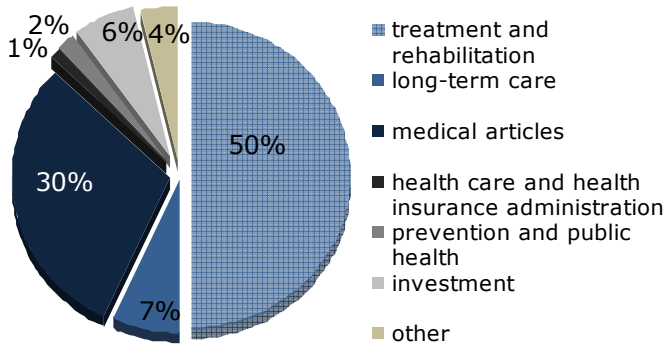
The National Health Fund finances health care services, offering patients a wide range of health benefits. The institution provides funds for the primary health care,

ambulatory and stationary specialist services; and reimbursement of some of the medicines. Beside the possibility of choosing the primary health care physician and a nurse, patient is enabled to choose any specialist from the list of doctors contracted by NHF. The same option applies to the hospital choice (NHF, 2010). The primary health care, ambulatory and stationary specialist services are provided free of charge after receiving the direction from the family physician (general practitioner).

Outside the scope of health benefits refunded by NHF remain partially or completely dental care, part of the specialist procedures and pharmaceuticals. The services of the dentist and dental materials are the example of a mixed system of financing. On the one hand, there is a mandatory health insurance, on the other hand – out-of-pocket payments incurred by a patient. The same rule holds for the pharmaceuticals. An insured recipient is entitled to receive a reimbursement on the pharmaceuticals under a prescription from a doctor.

Figure 9 pictures the destination of funds collected by means of methods described above. As we can see, half of the resources are spent on the treatment and rehabilitation. The second category of expenditures which absorbs most of the funds are the medical articles.

Figure 9. Structure of NHF's expenditures on health care with respect to the functions of services and products of health care, 2006.



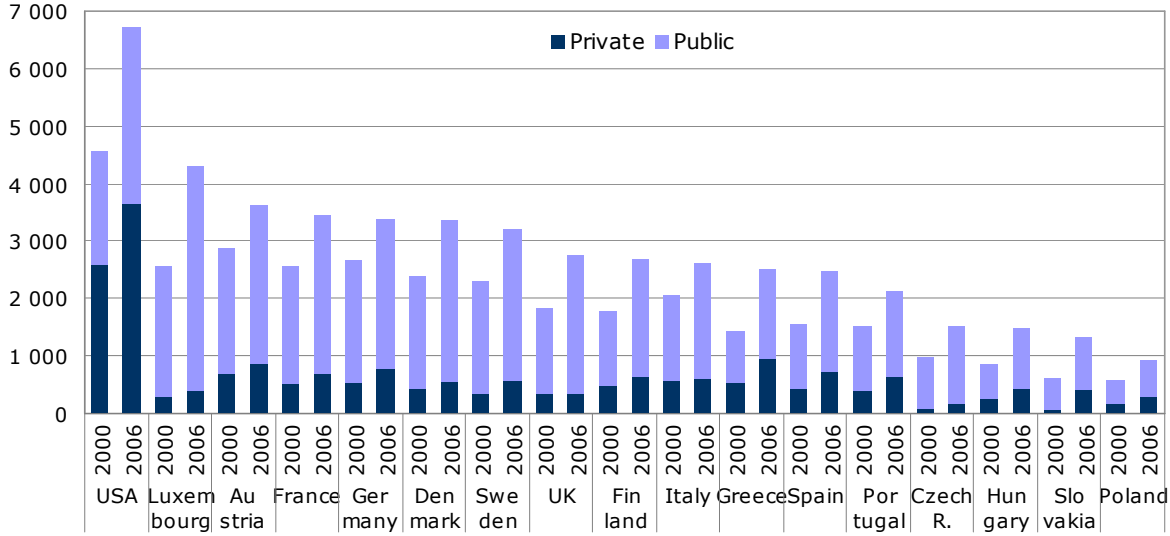
Source: CSO 2006

To compare Polish reality to other countries we now move to describe some main indicators of health systems in different regions of the world, mainly in Europe.

In Poland around 30% of total health spending comes from the private sector and the share is roughly constant across years. In most of the developed OECD countries health expenditures coming from the public sector account for around 80% of total health spending (see appendix, figure A-3).

An important indicator of the health situation in the country is without a doubt an amount of funds devoted to health. Figure 10 shows the total expenditures on health among OECD countries from 2000 to 2006. To allow for comparisons, presented data is in US dollars adjusted for purchasing power parity.

Figure 10. Per capita expenditures on health 2000-2006, US$ PPP.



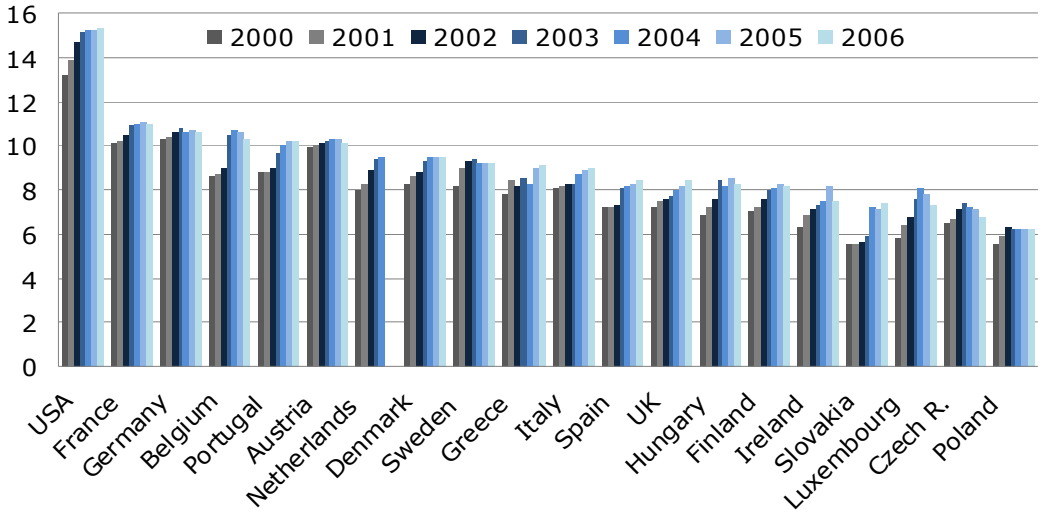
Source: OECD Heath data 2008

What can be seen from the figure 10 is the dispersion between older European Countries and the new member states. More developed countries of the Western Europe seems to be in a better position. Their expenditures on average equal US$ 2500-3300 PPP per capita. By contrast, in Central and Eastern Europe expenditure per capita is much lower, reaching on average US $ 1300 PPP. Among this group, Poland is the country which reduces the average. The level of total expenditure on health in the country remains very low - only US $ 910 PPP per capita in 2006. Moreover, the dynamics of health spending annual growth is also the smallest for Poland. This means, that in terms of total health expenditures Poland is far behind not only the Western European countries, but also neighbors in the Central and

Eastern European region where both the level of expenditure and the dynamics of their growth are higher. A good example of this phenomenon is Slovakia. Although this country started from a similar expenditures to Poland in 2000, the dynamics of its expenditures growth was much higher than Polish. After a period of a rapid growth, Slovakia considerably increased the gap between the two countries. According to the OECD data, Poland is one of the three OECD countries who spends least on health care[4]. From outside EU, country characterized with the largest total expenditures per capita is the USA, whilst inside EU – Austria.

Also in terms of another indicator – total health expenditures as a percentage of GDP, Western European countries are ahead of the rest of Europe. On average, these countries' health expenditure share in GDP is around 10-11%, with the highest value in France (figure 11). However, the gap between old and new European Union is not that deep. In the countries of Central and Eastern Europe relative expenditure in relation to GDP accounts for about 7-8%. Again Poland can be found at the end with the constant expenditures of 6,2% of GDP in 2004, 2005 and 2006.

Figure 11. Total expenditures on health as a percentage of GDP



Source: OECD Heath data 2008

The brief comparative analysis of health expenditures in the European Union shows a gap between the old and new member states. However, part of the countries

[4] graph A-2 in the appendix shows total health expenditures of OECD countries

seems to deal better with the problems and exhibits a high dynamics of growth, which each year brings them closer and closer to the developed countries. Unfortunately, Poland is not one of them. It is clearly seen that Poland is a country with the lowest value of per capita health expenditures and that they do not grow in an impressive pace. This low level of health spending is true both for the nominal per capita values, as well as in relation to GDP. Although we have to remember that the GDP per capita in Poland is more than twice less than in Western European countries[5], Slovakia with a similar level of GDP per capita seems to better deal with the problems and develops its health structures more dynamically. ☒

In practice, financing health care in Poland is one of the major social and economical problems. The law does not explicitly specify the time period of waiting for some of the medical procedures or define the benefit package of guaranteed and free treatments. Underpaid medical staff do not have a positive attitude towards patients which, among other factors, leads to a high dissatisfaction of the citizens with the medical care received in return for their considerable insurance contributions. Often, they have to pay out-of-pocket to visit a specialist within his private practice in order to avoid the long wait and/or to be treated with respect.

3.4. Pharmaceuticals

3.4.1. Pharmaceutical policy

The state's constitutional duty is to grant an equal access to the benefits of health care (art. 68 of the Polish Constitution). This rule applies also to the access to pharmaceuticals. The availability of drugs depends on many factors which have to be taken into consideration when creating optimal pharmaceutical regulations. The government's role seems to be especially important as the policy here requires dealing with conflict interests and demands of many actors. We are talking about a market in which the doctor, influenced by the pharmaceutical companies and the government, chooses, the patient buys and uses whilst someone else pays for the product.

[5] see figure A-1 in the appendix

First of all, policy makers have to guarantee a proper and equal access to safe and effective medicines to social groups with different incomes. In order to prevent private drug expenditures from reaching unaffordable level, government, equipped with the regulating instruments, creates rules for the drugs reimbursement and controls the market in terms of prices as well as approval of the medical products. This requires authorities to determine the size of public funds to be spent on health programs and payments for drugs, at a level that will help inhibiting the deterioration of public health and ensure its improvement in the future. Patients need to be protected not only against exaggerated prices but also against harmful medicines and irrational drugs usage. Countries regulate the standards for prescribing as well as create incentives for promotion of the proper use of medicines. Reimbursement of drugs is a powerful instrument which creates demand and supply for certain types of medicines. All these actions intervene in the competitiveness of the pharmaceutical market, imposing entry barriers for new market entrants or creating environment for monopolies.

The costs of drugs for several years have been the most rapidly growing component of costs of providing health services. Drugs are a product delivered by the pharmaceutical market, which enters the health care system from outside. Thus, the range of the drugs costs is shaped in the major part by market conditions of the product.

Pharmaceutical policy is an integral part of the state's health strategy because it forms the basis for an effective prevention. Therefore, it has to provide patients with an access to reliable information about effects and consequences of taking drugs as well as to optimal pharmacotherapy solutions in consideration with the current economical and social situation of the country. In order to do that, there is a need to create rules and structures responsible for constant improvement of safety and cost-effectiveness of medicines, assessed by a credible analysis based on international standards and national experiences. Government must also create incentives to encourage drug development and research among the pharmaceutical industry so to remain innovative and be up-to-date with new methods and technologies.

Pharmaceutical regulations in Poland create frames for drugs registration as well as a list of categories of medicines which are subject to reimbursement.

In relation to the type of disease and method of reimbursement, pharmaceuticals can be divided into the following categories (NHF, 2010):

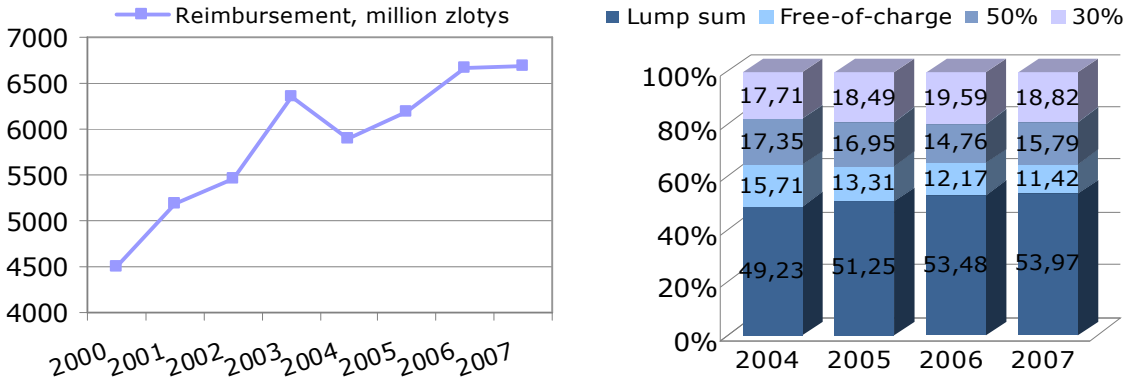
- elementary; life-saving or necessary for the particular therapy, paid at a flat-rate from 3,2zl (1,03 $US PPP 2009) to the upper limit of the amount of reimbursement specified for the type of drug,
- medications supporting and complementing action of elementary pharmaceuticals; patients pay 30% or 50% of the drug's price,
- medicines and medical products used for selected chronic diseases, issued free-of-charge,
- recipe drugs, made from raw pharmaceutical ingredients, as well as part of the essential and complementary medicines, which meet certain requirements, are issued at a flat rate of 5zl (1,6 $US PPP 2009).

In compiling the lists of reimbursed drugs it is important to take into account, in addition to the therapeutic value of the drug, the safety of its use as well as the cost of therapy. Cost-effectiveness of medicine for specific indications should be assessed before making a decision on the refund on the basis of a credible economic analysis in health care (Evidence-Based Medicine). This analysis should be conducted in accordance with international standards and based on available statistics regarding the health care system in Poland. According to European recommendation, institutions deciding on the allocation of financial resources and responsible for health of the citizens, should have an objective tool to assess the usefulness of medical procedures. Priority for placement on the lists of elementary, complementary and chronic diseases pharmaceuticals should be given to the medicines which at the lowest cost guarantee the highest therapeutic effect. In order to fill reimbursement lists with safe and cost-effective pharmaceuticals, health minister bases his decisions on reports prepared by the Agency of Health Technology Assessment.

3.4.2. Drug expenditures

The reimbursement is the most important factor in drug policy pursued by government. Public expenditure on reimbursement of medicines, after 16% growth in 2003, fell in 2004 due to NHF's reimbursement list reductions, and started raising at a lower rate during the next 2 years. In 2007 the reimbursement growth rate declined to 0,44%. Graph on the left in the figure 12 presents the value of drugs reimbursement from 2000 to 2007. The stagnation can be seen at the end of investigated period.

Figure 12. Drugs reimbursement

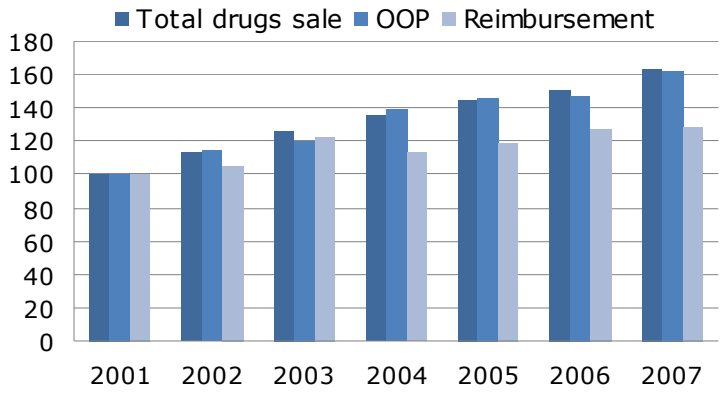


Source: NHF

Pharmaceutical policy can be characterized with preferences for certain types of refund. The second graph presents the structure of reimbursement in Poland. During the period in question share of reimbursement through a lump-sum (flat rate) increased from initial 49% to 54% of the overall resources. It have been done at a cost of the free-of-charge medicines' share, which declined from almost 16% to 11,4% in 2007. Changes in the reimbursement structure seem to be a tool to keep the public expenditures low. We can expect that as every budget, health budget searches for savings. Medicines that are issued free of charge are the highest burden for the pharmaceuticals financing system. Therefore, as level of reimbursement is held low, share of the drugs subject to full refund in overall reimbursement declines across years whilst the least incriminatory flat rate's share increases.

The dynamics of the reimbursement does not go hand in hand with constant increase in the total drugs sale and the fast growth of OOP expenditures. It can be seen in the figure 13, which shows the dynamics of the total sales of drugs, scale of reimbursement and OOP expenditures in constant 2001 prices (2001=100). It is evident that due to reimbursement reduction in 2004, OOP spending on drugs grew 3 times more between 2003 and 2004 than between 2002 and 2003.

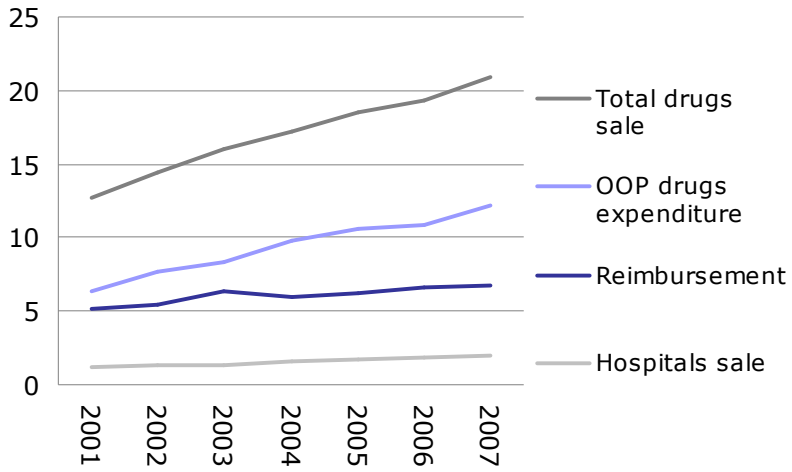
Figure 13. Drugs reimbursement



Source: Health Care Financing in Poland – the Green Book 2008

The total value of drug retail sales in the years 2000 - 2007 had an increasing trend, but with varying dynamics. In the years 2004 - 2006 the rate declined, but in 2007, it increased again. Both the sale of medicines for hospitals, as well as significantly higher apothecary sales characterized by extremes of growth. The following graph illustrates the change observed across the period in nominal terms (figure 14). As we can see, hospital sales line characterizes with a steady trend, so does the reimbursement line. However, total drugs sale as well as OOP expenditures keep increasing to reach numbers almost two times higher in 2007 than in the initial year.

Figure 14. Drugs sale, billion zlotys



Source: Health Care Financing in Poland – the Green Book 2008

The conclusions arising from these comparisons are clear. The total drug retail sales has increased by about 90% nominally and 50% when looking at the constant 2001 prices, during the investigated period (2000-2007). Reimbursement does not follow the dynamics of sales and consumption of drugs in Poland. In real terms, refund rate increased during 2000-2007 by only a few percent (in nominal terms by 48.4%). Consequently, a lower growth of the reimbursement during the investigated period caused a jump in the OOP drugs spending. With such a high growth rate, across years OOP expenditures increased by around 92% in nominal terms and around 62% in real terms.

Table 1 provides an insight into the pharmaceutical expenditures in Poland in comparison to other European Union countries. Facts that draw attention are the lowest level of per capita total drugs expenditure, expressed in US dollars adjusted for purchasing power parity, as well as the highest share of private drugs spending in the total expenditures on health among the presented countries.

Table 1. Pharmaceutical expenditures in selected European Union countries, 2006.

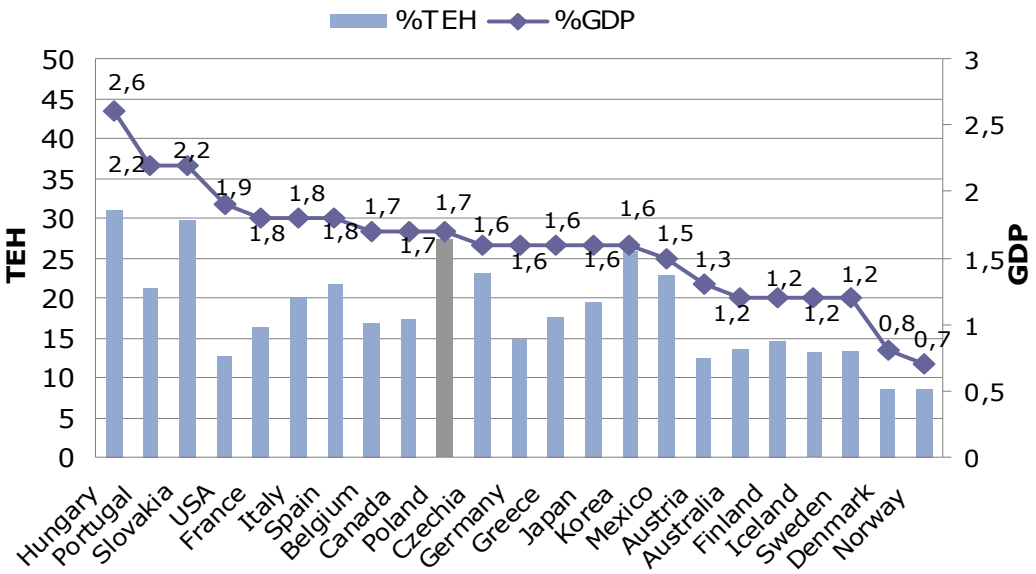
	Total drugs expenditure			prv drugs exp, %TEH
	per capita US$ PPP	%GDP	% of TEH	
Austria	449	1,3	12,4	3,9
Czech R	349	1,6	23,1	6,7
Denmark	286	0,8	8,5	3,8
Finland	389	1,2	14,6	6,5
France	564	1,8	16,4	5
Germany	500	1,6	14,8	3,8
Greece	438	1,6	17,6	1,3
Hungary	466	2,6	31	10,2
Italy	524	1,8	20	10
Luxembourg*	349	0,7	8,4	1,4
Poland	**248**	**1,7**	**27,2**	**16,7**
Portugal	451	2,2	21,3	9,4
Slovakia	389	2,2	29,7	8,1
Spain	533	1,8	21,7	6
Sweden	426	1,2	13,3	5,4

* 2005

Source: OECD Heath data 2008

Expenditures on overall health care services (see figure 10), as well as on medicines in terms of per capita US$ in Poland are much lower than the average for the old members of the EU. However, share of spending on drugs as a percentage of GDP and total expenditures on health is relatively high, what can be seen in the figure 15. This phenomena is true for all of the Central and Easter European countries which characterize with a lower level of development. There is a relatively small level of health care spending accruing per inhabitant, and at the same time bigger share of those narrow resources is allocated in pharmaceuticals, in compare to developed countries.

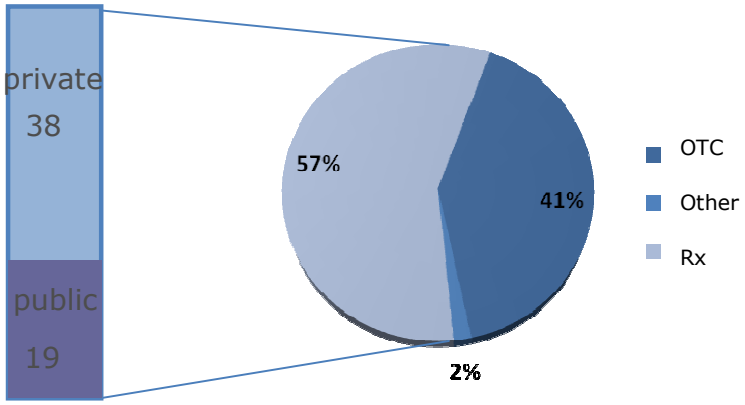
Figure 15. Total pharmaceutical expenditure, % of TEH and GDP (2006)



Source: OECD Heath data 2008

We recall from the figure 1 that more than 60% of total drug spending in Poland come from the private sources. Medicine expenditures exceed the possibility of financing them from the public budget or social insurance and therefore, we observe an increase of the private sector's role. What is more, private expenditures on drugs comprise of out-of-pocket spending in 98% (CSO, 2008). From the figure 16 we can see that in fact, OOP spending on medications is considerable, taking into account the fact that 41% of expenditures is on OTC drugs and 19% is spent as a co-payment for the Rx medicines. Therefore, patients in Poland in fact cover 60% of total pharmaceutical expenditures out-of-pocket.

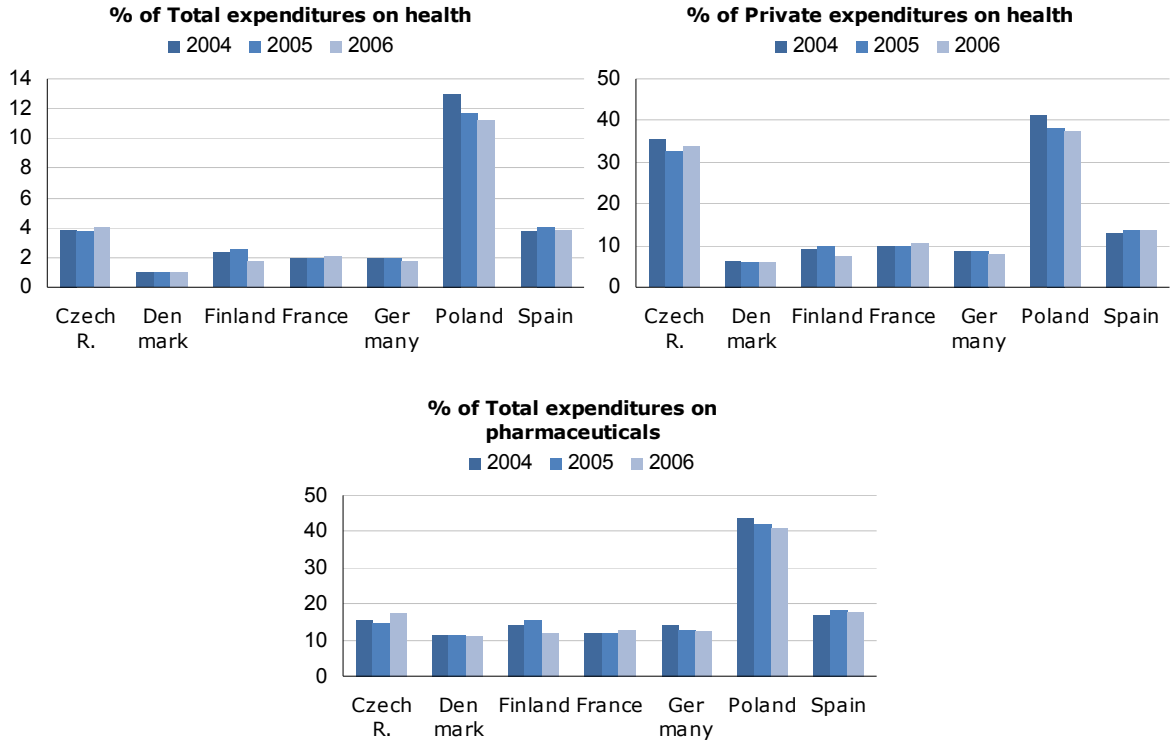
Figure 16. OTC and Rx expenditures in Poland, 2006.



Source: OECD Heath data 2008

A simple glance at figure 17 provides a striking view of just over-the-counter medicines. The graphs present the over-the-counter drug expenditures separately as a share of total expenditure on health, total expenditure on pharmaceuticals and total private expenditures on health in a few European countries. An overwhelming dominance of the OTC expenditures can be seen in each unit category. Although they decline across years, in 2006 their share in every health variable are far higher than in other countries.

Figure 17. Share of OTC pharmaceuticals expenditure



Source: OECD Health Data 2008

This chapter purposed in showing why, between all types of OOP expenditures on health, it is interesting to look at just the pharmaceutical expenditures. Among selected European countries, Poland has the highest private expenditures' share in total pharmaceutical spending. At the same time, health expenditures per capita of the country is definitely lower than in the developed European states. Despite the growth, Polish public health expenditures are still insufficient to cover all of the actual costs, therefore part of them become a serious financial burden for the households. Dynamically rising consumption of drugs does not come along with the level of reimbursement what leads to one of the highest levels of co-payment incurred by Polish patients. However, the co-payment issue is not the only reason why OOP pharmaceutical expenditures are so significant. OTC spending in 2006 accounted for 11% of total health expenditures, 37% of private expenditures on health and 41% of the total drug spending in Poland.

In the next chapter we will investigate, how these striking facts we discussed in this section influence people in Poland. We will analyze to what extent the pharmaceutical spending is a financial burden for the individuals.

4. Empirical part

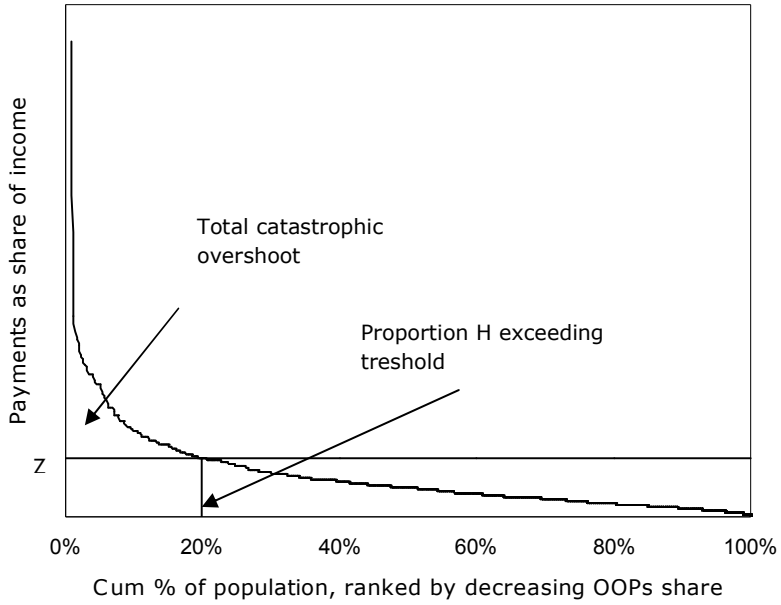
4.1. Methodology

4.1.1. Catastrophic payments

Catastrophic health payments are the medical expenditures that are so large that they exceed a pre-specified percentage of the household budget in a given period. If the out-of-pocket health spending is too high it considerably disrupts consumption of other important goods and services household needs to exist. To cover an extra medical cost, a household can either cut off a current consumption or finance it through savings or sale of assets if it has any. The latter might be a serious limitation of the approach, since it is difficult to measure to what extent which is income reduced by spending on food and other necessities. In this study we use the pre-payment income - x - as the dataset lacks the information about household's expenditures. We settle a threshold, call it z, above which the ratio of OOP to income (T/x) will be considered catastrophic.

First of the measures we take a closer look at is the catastrophic payment headcount, which is simply the fraction of households whose out-of-pocket payments' share in income exceeds the threshold z. This is shown in figure 18 below.

Figure 18. Catastrophic out-of-pocket expenditures as share of pre-payment income, by cumulative % of population.



Source: O'Donnell, van Doorslaer, Wagstaff and Lindelow (2008)

According to the figure, graphing the OOP expenditures as a share of pre-payment income by cumulative percentage of households, the curve intercepts with the threshold line at 20%, indicating that 20% of the sample experiences catastrophic health spending. This catastrophic payment headcount can be written as:

$$H = \frac{1}{N}\sum_{i=1}^{N} E_i = \mu_e \,, \tag{1}$$

where N is the sample size, E_i takes the value of 0 when T/x does not exceed the threshold z_{cat}, and the value of 1, when T/x is greater than z. Thus, the headcount ratio is the mean of the indicator E_i.

Unfortunately, presented measure can only explain the incidence of catastrophic spending. It is blind to the depth of it, namely, to what level on average do households exceed the threshold. Therefore, we need to introduce a measure that can show not only the incidence of the catastrophic spending, but also the intensity.

The household catastrophic overshoot can be defined as:

$$O = \frac{1}{N}\sum_{i=1}^{N} O_i = \mu_o \text{ ,} \tag{2}$$

and $O_i=E_i((T_i/x_i)-z_{cat})$.

If we look at the figure 18, the catastrophic overshoot can be seen as the area above the z_{cat} line and below payment share curve.

The two presented measures can be joint by the third one, the mean positive overshoot:

$$MPO = \frac{O}{H} \text{ ,} \tag{3}$$

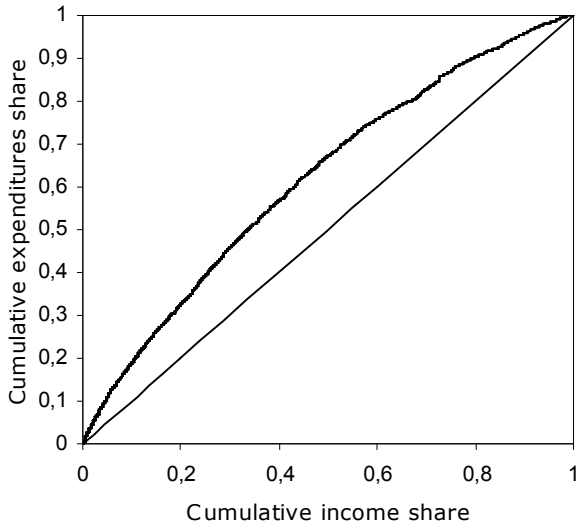
or $O = H \times MPO$. Thus the catastrophic overshoot is a product of the incidence times the intensity.

Now, if we would like to take into account not only occurrence and intensity but also the distribution of catastrophic payments, we have to introduce new measures. The problem with the headcount and overshoot indices is that they do not show whether the poor or the better-off are exceeding the threshold. This is an important matter, because high medical costs will be much more significant for the poor's budget than for the better-off.

A way to see which income group is more vulnerable to incur this kind of catastrophic expenditure is to weight previously introduced measures using a concentration index.

The index is defined as twice the area between the concentration curve and the line of equality on the graph plotting the cumulative share of the sample ranked by income on the x-axis against the cumulative expenditures share on the y-axis:

Figure 19. Concentration curve



If the concentration index is negative, the concentration curve lies above the line of equality, indicating that the poor are those who exceed the threshold. When the concentration index is higher than zero, the opposite holds, meaning that the better-off tend to incur medical costs above the threshold.

Following the procedure from O'Donnell, van Doorslaer, Wagstaff and Lindelow (2008) to obtain the concentration index we use the formula:

$$2\sigma_r^2 \frac{h_i}{\mu} = \alpha + \beta r_i + \varepsilon_i, \tag{4}$$

where *r* is the fractional rank of the income distribution, σ_r^2 is its variance, *h* is the investigated out-of-pocket pharmaceutical expenditures variable and μ is its mean. The concentration index is equal to an estimate of β, obtained by the Ordinary Least Squares method. Because the data is weighted, we use the following formula to get the weighted fractional rank:

$$r_i = \sum_{j=0}^{i-1} w_j + \frac{w_i}{2}, \tag{5}$$

where income is sorting in ascending order, w_i is the sample weight scaled to sum to 1 and w_0 equals zero.

By using the regression from the formula (4) we can obtain the concentration indices for headcount and overshoot ratios, C_E and C_O, respectively. Thus, the modified, weighted headcount and overshoot indices will take the form of:

$$H^W = H(1 - C_E) \tag{6}$$

$$O^w = O(1 - C_o)$$

Using the scheme presented above, we weight the dummy indicator, H, and the catastrophic overshoot ratio, O, to obtain new, more reliable values, which take into account the concentration of the catastrophic medical expenditures among households with different income levels (Wagstaff and van Doorslaer 2003).

The explanation of these notations is that a negative concentration index, which means that the catastrophic spending is concentrated amongst poorer people, will in effect increase the headcount and overshoot ratios. If the concentration index is positive, lower weights will be attached to headcount and overshoot ratios, indicating that those who exceed the threshold tend to be better-off. Placing weights on the introduced measures allows for a better and more authentic reflection of the reality. Low-income households are more vulnerable and exposed to health shocks and thus a greater weight is attached to the headcount and overshoot ratio, emphasizing the seriousness of the problem.

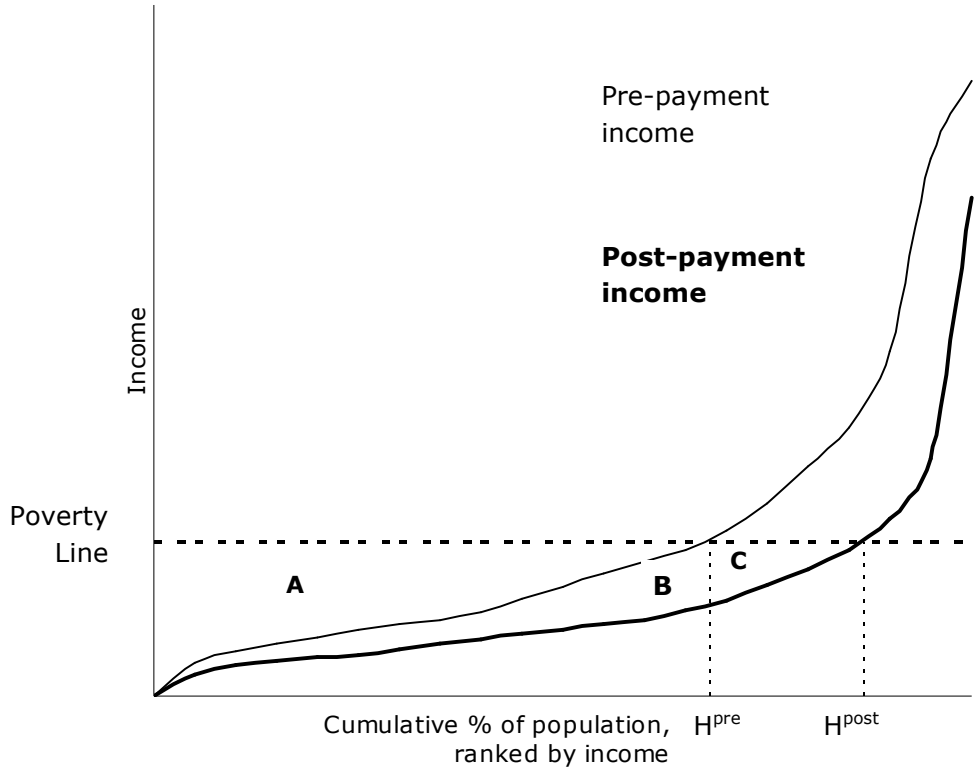
4.1.2. Impoverishing payments

In the previous part we introduced measures that allowed us to assess the catastrophic out-of-pocket expenditures and their influence on households depending on a different income level. This part presents methods that analyzes the same out-of-pocket medical spending in terms of their impact on the problem of poverty.

Following the steps taken by Wagstaff and van Doorslaer (2003) we aim at obtaining the poverty headcount and poverty gap. Figure 3 represents an example

of a Pen's parade and graphs income before and after the out-of-pocket spending against the cumulative percentage of population ranked by income. We set a threshold as a poverty line which takes a fixed value instead of a percentage share. Both curves intersect with a poverty line, indicating the respective poverty headcounts, H^{pre} and H^{post}. As can be seen from the graph, post-payment poverty headcount is higher than the pre-payment headcount. Moreover, the figure also shows the poverty gaps which are useful in terms of measuring the depth of poverty. They can be seen as the area below the poverty line but above each curve. The area A represents the poverty gap for the pre-payment income, whilst the gap for the post-payment income is larger by the area B+C.

Figure 20. Pen's Parade demonstrating the poverty headcount and poverty gap on pre- and post-payment income.



Source: Wagstaff and van Doorslaer (2003)

Similarly to previous procedure we set a threshold at a fixed value of the poverty line *PL*. This time *T* is the per capita household OOP spending on health care. Let x_i

be the pre-payment income of the i's individual. The pre-payment poverty headcount takes the form:

$$H_{pov}^{pre} = \frac{1}{N}\sum_{i=1}^{N} P_i^{pre} = \mu_{P^{pre}}\,, \tag{7}$$

where the indicator P_i^{pre} equals 1 when x_i is below the *PL* and zero otherwise. The pre-payment poverty gap can be defined as:

$$g_i^{pre} = P_i^{pre}\left(PL - x_i\right), \tag{8}$$

whilst the pre-payment mean poverty gap takes the form:

$$G_{pov}^{pre} = \frac{1}{N}\sum_{i=1}^{N} g_i^{pre} = \mu_{g^{pre}} \tag{9}$$

In order to compare the mean poverty gap across years in case the poverty lines vary between one another, it is possible to calculate the normalized pre-payment poverty gap:

$$NG_{pov}^{pre} = \frac{G_{pov}^{pre}}{PL} \tag{10}$$

Analogously to the catastrophic approach, the intensity of poverty is defined by the mean positive pre-payment poverty gap:

$$MPG_{pov}^{pre} = \sum_{i=1}^{N} g_i^{pre} \Big/ \sum_{i=1}^{N} p_i^{pre} = \frac{\mu_{g^{pre}}}{\mu_{P^{pre}}}\,, \tag{11}$$

rearranging:

$$\mu_{g^{pre}} = \mu_{P^{pre}} * MPG_{pov}^{pre} \tag{12}$$

To obtain the post-payment poverty measures, we have to subtract the OOP expenditures (T_i) from income x_i. We use the same equations as before, substituting x_i with $(x_i - T_i)$.

We have discussed the implications of poverty for the headcount ratio and the poverty gap when taking into account just the income and after reducing it by the OOP medical spending. The difference between pre-payment and post-payment indicators are the poverty measures that we need to define. Thus, the poverty indicators for the headcount ratio, poverty gap and the normalized poverty gap take the forms:

$$PI^{H} = H_{pov}^{post} - H_{pov}^{pre}, \tag{13}$$

$$PI^{G} = G_{pov}^{post} - G_{pov}^{pre}, \tag{14}$$

$$PI^{NG} = NG_{pov}^{post} - NG_{pov}^{pre}. \tag{15}$$

4.2. Data and sample

The dataset used for this research is taken from the "Social Diagnosis" Project, downloadable from www.diagnoza.com. It is a panel study, in which the same households are being investigated every few years. Social Diagnosis is an interesting project, because the survey asks not only about raw facts, like the standards of living or income. It focuses on the real aspects of life, social and financial well-being, about how people feel about their lives, what kind of difficulties they encounter or what do they feel insecure about. Each year in question the study is conducted in March so to exclude the seasonal effect. The reports from this study purpose not only in picturing the today's society, but it allows the researchers to investigate changes during the last ten years of different transformations in Poland.

Each round available families from the previous years take part in the study as well as additional households, drawn from a new representative sample. So far, five rounds were conducted; in 2000, 2003, 2005, 2007 and 2009. Obviously, some of

the households were excluded due to moving, death or refusal. The table below shows the size of the sample for each year, indicating how many households have remained the same.

	2000	**2003**	**2005**	**2007**	**2009**
Total	3005	3961	3851	5532	12381
From the previous year		2396	3113	2760	3686
From 2000 to 2009					1024

In order to become representative, the sample has been weighted with analytical weights, created according to few stratification categories, like gender, age, education and region. Applying the analytical weights allowed to restore the proper proportions of the number of households in the sample in relation to population size of households in different regions at the same sample size which have been examined.

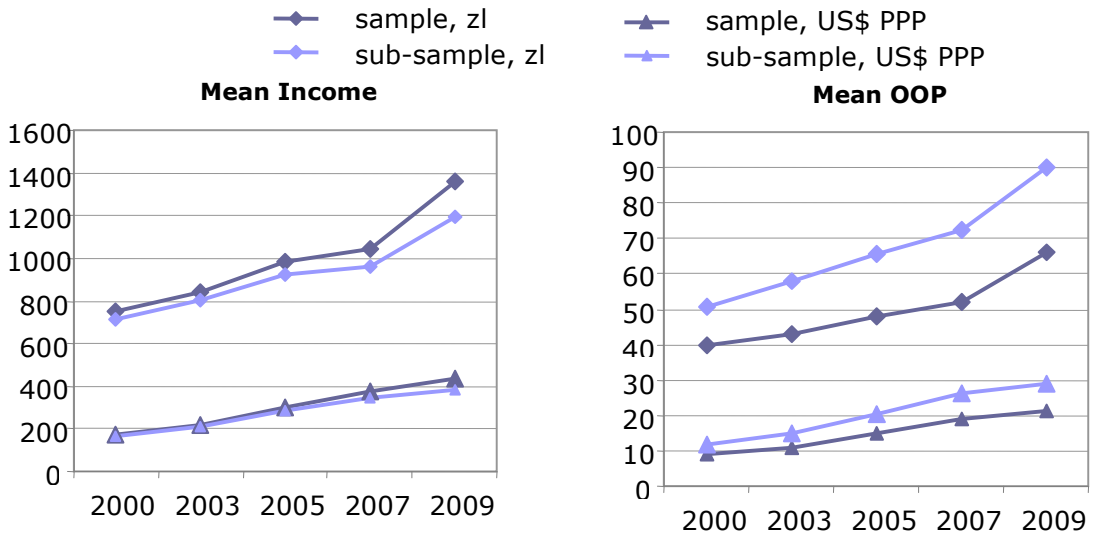
For the purpose of my study only a few variables have been used. For the catastrophic approach, we use income and out-of-pocket drug spending for the household as a sharing unit. As for the poverty indicators, households were split into the "consumption units" using the equivalence scale, which have been obtained by applying weights on the household members.

Income is used as the living standard measurement and it is derived from the question about the household's last month's income. As the health care out-of-pocket expenses measure serves the variable answering question about how much was spent on drugs and other medical non-durables by the household during the last 3 months. The variable was divided by three to obtain the monthly spending. We will use the abbreviation OOP for expenditures concerning only pharmaceutical spending.

We now move to presenting the descriptives of the whole sample as well as of the sub-sample. The latter has been obtained by restricting the dataset to observations concerning retired and chronically ill people. The criteria is that they do not work anymore, or they are unable to because of a continuous sickness. Population of the sub-sample receives money through diverse pensions or social allowances. The percentage share of the retired and chronically ill accounts for around 40% of

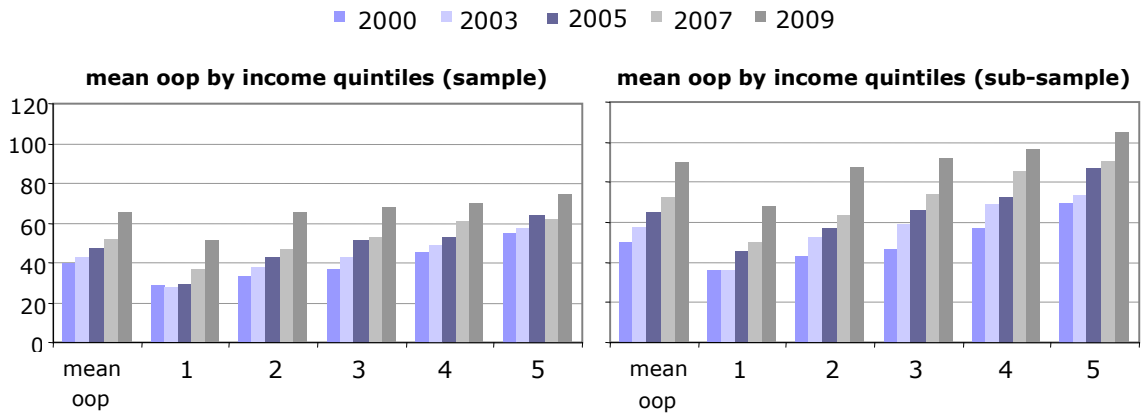
observations in each year. Graph 1 shows mean income and mean OOP expenditures in zlotys and in US$ PPP adjusted. It can clearly be seen that the average income is higher for the sample as a whole, whilst average OOP is larger for the sub-sample. From 2000 to 2009 income of the population grew by 82% and earnings of the retired and chronically ill increased by 67%. Pharmaceutical spending was more dynamic among households belonging to the sub-sample. During investigated period, it grew by 78% whilst expenditures observed in the whole sample rose by 67%.

Graph 1



The following graph allows for comparison of the OOP expenditures incurred by different income groups. In both cases, the conclusion is that during the first three investigated years, households from the last income group on average spent on drugs twice as much as households located in the first income group. In 2007 and 2009 the dispersion is smaller.

Graph 2.



4.3. Results

The section has been divided into 3 sub-sections. In the first one we can find the empirical illustration of the catastrophe approach, using the whole representative dataset. The second sub-section will present the empirical results of the poverty approach. In the third part of the section we modify the dataset to contain only the observations for the retired and chronically ill people. Following the same procedure, we are able to investigate whether in fact the catastrophic and impoverishing drug spending considerably influences the two vulnerable groups. The last sub-section presents evidence of what part of the sample is unable to afford drugs.

4.3.1. Catastrophe approach

First step we take is dividing the OOP by income to obtain the out-of-pocket expenditure's share. The living standard indicator we use is the pre-payment income, thus, following Wagstaff and van Doorslaer (2003) further we set four thresholds at 2,5%, 5%, 10% and 15% level.

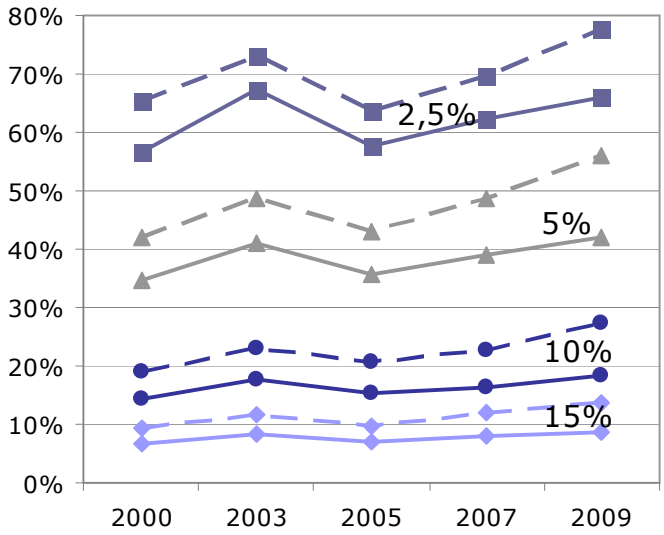
Table 2 gathers the results for the incidence of catastrophic medical expenditures.

Table 2. Incidence of catastrophic out-of-pocket drug spending in Poland

		Headcount measures			
		H	H^w	C_e	H^w-H
2000	2,5%	56,77%	65,19%	-0,1484	8,42%
	5%	34,71%	42,05%	-0,2115	7,34%
	10%	14,24%	18,84%	-0,3232	4,60%
	15%	6,62%	9,30%	-0,4036	2,67%
2003	2,5%	67,47%	73,15%	-0,0806	5,68%
	5%	41,03%	48,67%	-0,1862	7,64%
	10%	17,56%	22,95%	-0,3068	5,39%
	15%	8,46%	11,63%	-0,3736	3,16%
2005	2,5%	57,62%	63,70%	-0,1054	6,08%
	5%	35,51%	43,03%	-0,2119	7,52%
	10%	15,30%	20,66%	-0,3503	5,36%
	15%	6,90%	9,73%	-0,4107	2,83%
2007	2,5%	62,23%	69,63%	-0,1190	7,40%
	5%	38,93%	48,55%	-0,2473	9,63%
	10%	16,43%	22,71%	-0,3826	6,28%
	15%	7,89%	11,84%	-0,5010	3,95%
2009	2,5%	65,92%	77,65%	-0,1779	11,73%
	5%	41,88%	55,84%	-0,3332	13,96%
	10%	18,50%	27,46%	-0,4842	8,96%
	15%	8,54%	13,53%	-0,5846	4,99%

Logically, increasing the threshold from 2,5% to 15% of total income causes a decrease in the incidence of catastrophic spending. Headcount ratio for each threshold varies considerably across years. It can be seen that for each threshold, the headcount rises in 2003, then falls in 2005, and increases again till 2009 to reach level higher than the initial one in 2000. Between the initial 2000 year and the last investigated year 2009, there is an increase of almost 10 percentage points at 2,5% threshold, 7 percentage points at 5% threshold and 2-4% at the remaining thresholds. Behavior of the headcount ratios across years can be clearly observed from the graph 3. They are represented by the solid lines.

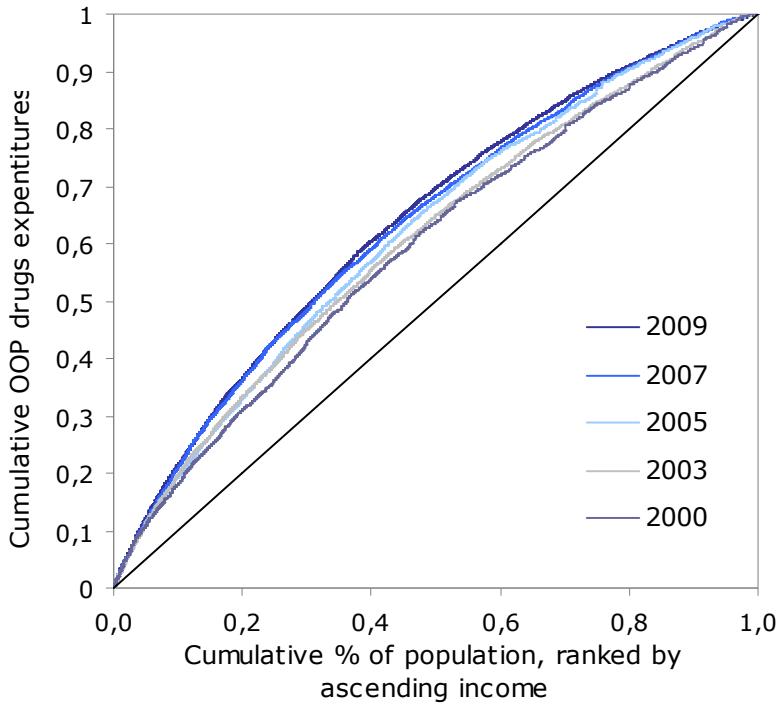
Graph 3. Headcount and weighted headcount measures.



According to the calculations of the concentration indices, catastrophic medicines costs are incurred mostly by the poor. All of the indicators take negative values which means that the catastrophic payments are concentrated among the worse-off. As a result, the weighted headcount ratio increases for every year and for each threshold level.

The following graph 4 is consistent with the observation that over the years inequality in the drug spending is raising. The 2009 concentration curve lies the furthest from the white equality line indicating the highest concentration of catastrophic out-of-pocket expenditures among the poor. The 2000 concentration curve is located the closest to the line of equality. The remaining curves can be found in between the two mentioned concentration curves.

Graph 4. Concentration curves



It is worth mentioning that the lowest concentration indices can be observed for the year 2007 and 2009, indicating that the concentration of medicine expenditures among the poor is getting more and more serious over the years. Negative concentration indices lift all of the headcount ratios up and thus the weighted measures of the incidence are higher by a few percentage points. This is presented in the last column of the table 2, as a difference between H^w and H. In 2009 at the lowest thresholds the change between initial and rank-weighted headcount ratios surpasses 10 percentage points.

Analyzing weighted headcounts, we can say that in 2000, 65,2% of the sample spent 2,5% of their income on drugs. The measure increased in 2003 by 10 percentage points and fell in 2005 to 64%. After rising, in 2007 almost 70% of the sample incurred medicines' cost of 2,5% of their income. In 2009 the headcount reached almost 78% which was 13 percentage points higher than in the initial year. At the 5% threshold, the situation was similar, and in 2009 more than a half of households spent 5% of their income on drugs. Comparing to the initial year, headcount measure increased by 13 percentage points. For the 10% threshold the headcount was around 20% in the first four investigated years. In 2009 more than

a quarter of the respective sample recorded drug expenditures above 10% of their income. Fifteen percent of income was spent on medicines by around 9%, 11%, 10% and 12% of the samples in 2000, 2003, 2005 and 2007, respectively, whilst in 2009 the weighted headcount ratio accounted for 13,5%. In the latter case, the concentration index reached the lowest rate of -0,58, implying the highest concentration of medical spending among the poor. The results of the weighted headcounts rates are represented by the dotted lines in the graph 3.

After analyzing the incidence of catastrophic expenditures we now move on to the intensity investigation. Table 3 presents the obtained results.

Table 3. Intensity of catastrophic out-of-pocket drug spending in Poland

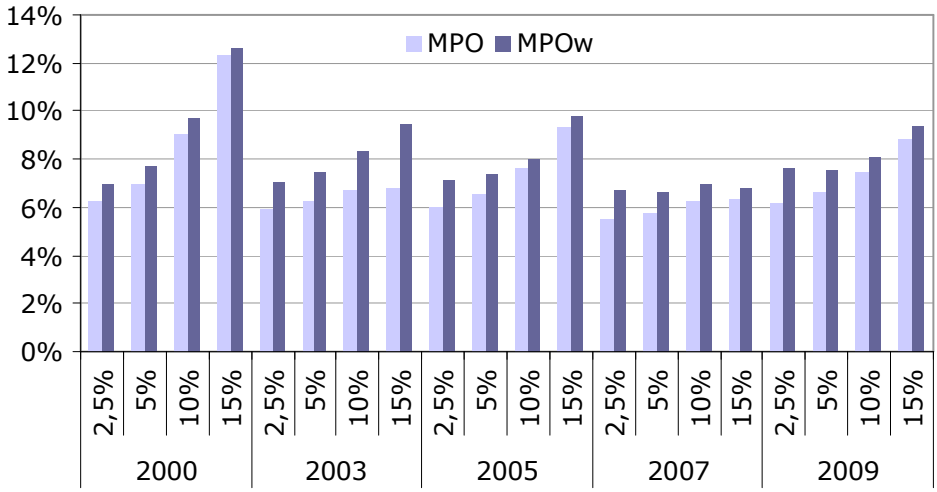
		Gap measures				
		O	O^w	C_o	MPO	MPO^w
2000	2,5%	3,52%	4,56%	-0,2964	6,20%	6,99%
	5%	2,41%	3,24%	-0,3460	6,94%	7,71%
	10%	1,29%	1,83%	-0,4174	9,06%	9,71%
	15%	0,82%	1,18%	-0,4430	12,30%	12,65%
2003	2,5%	3,97%	5,16%	-0,2974	5,89%	7,05%
	5%	2,66%	3,61%	-0,3589	6,26%	7,42%
	10%	1,32%	1,91%	-0,4487	6,72%	8,32%
	15%	0,73%	1,10%	-0,5139	6,76%	9,44%
2005	2,5%	3,47%	4,52%	-0,3034	6,02%	7,09%
	5%	2,34%	3,18%	-0,3609	6,58%	7,39%
	10%	1,16%	1,66%	-0,4323	7,58%	8,04%
	15%	0,64%	0,95%	-0,4749	9,33%	9,75%
2007	2,5%	3,45%	4,69%	-0,3606	5,54%	6,74%
	5%	2,24%	3,23%	-0,4409	5,75%	6,64%
	10%	1,02%	1,59%	-0,5537	6,21%	6,98%
	15%	0,50%	0,81%	-0,6109	6,35%	6,82%
2009	2,5%	4,07%	5,89%	-0,4456	6,18%	7,58%
	5%	2,77%	4,22%	-0,5263	6,60%	7,56%
	10%	1,38%	2,23%	-0,6174	7,46%	8,13%
	15%	0,76%	1,27%	-0,6803	8,85%	9,38%

The calculated measures tell us to what extent on average households exceed thresholds, which again are set as 2,5%, 5%, 10% and 15% of the budget. The results are more stable and the overshoots do not vary that considerably across years. The overall trend is that from the initial 2000 year, the overshoot rate increased slightly in 2003 and then was very similar in 2005 and 2007. Again, the highest obtained results were observed in 2009. The intensity of catastrophic drug expenditures was higher in 2009 than in 2000 for most of the thresholds, but the differences were very small. Thus, over the period in question the overshoot effect increased and households had a tendency to exceed the thresholds at slightly higher rates.

Again, concentration indices are all negative, indicating that the poor are those who overshoot thresholds. Therefore, weighted overshoot rates are lifted up on average by 1-2%. The lowest concentration indices can be found in 2009, confirming the highest inequality in this year.

Let us take a closer look at the mean positive overshoot measure. As defined in (3) MPO equals the intensity divided by the incidence of catastrophic spending. When taking into account the regular headcount and overshoot ratios, the MPO increases when raising a threshold each year (graph 5). It can thus be interpreted that at higher thresholds the overshoot effect is even more significant. The MPO of 8,85% in 2009 means, that households whose drugs expenditures exceed 15% of their budget, on average spend 23,85% (15%+8,85%) of their income on pharmaceuticals. When we adjust the results to take into account the weighting scheme, we obtain higher weighted mean positive overshoot, which similarly rises with the threshold for every year. The bigger the threshold, the more it is overshot. The highest weighted MPO of 12,65% can be found in 2000 at 15% threshold. Thus, households, which in 2000 devoted more than 15% of their income on drugs, on average spent 27,65%.

Graph 5. Mean positive overshoot and weighted mean positive overshoot.



4.3.2. Impoverishment approach

We start by selecting poverty lines measuring absolute and relative poverty. A good candidate for the latter is the relative income poverty line. As discussed at the Poverty Site[6], it is a widely used measure to assess and investigate poverty in the European Union. Therefore, we set the line as 60% of median income per consumption unit.

Values of absolute poverty line are obtained in a more complicated way. Institute of Labor and Social Studies (ILSS) calculates it based on the conception of a subsistence minimum. It can be defined as a current monetary value of the basket of goods which is supposed to satisfy the minimum biological needs. Absolute poverty line is a limit, below which there is a biological and psychophysical threat to people's lives. The dynamics of the subsistence minimum basket is generally consistent with inflation trend, though never the same as its level (Kurowski, 2009). Therefore when calculating the absolute poverty line, ILSS takes into account both, rate of inflation and a change in the basket's value across years.

The values of poverty lines are different for each investigated year, but with the normalized poverty measures we are still able to make comparisons between years.

[6] http://www.poverty.org.uk/summary/eapn.shtml [17.03.2010]

Table 4 presents the results of the impoverishment approach. We can see that, in fact, money spent by the individuals on drugs do have an influence on the poverty rates. From the look at the headcount indicators for the relative poverty line, it is evident that pharmaceutical expenditures themselves impoverished 3,8% of the sample in 2000; 2,58% in 2003; 2,83% in 2005; 3,97% in 2007 and 4,92% in 2009. Thus, although the pre-payment poverty decreased in 2009, the post-payment poverty headcounts increased during the investigated period. Relative poverty pre-payment and post-payment gaps increase and we can see that the intensity in 2009 is twice the intensity in 2000. However, if we compare them in terms of the normalized poverty gaps, the difference between years is slight. The last rows of the table show that pharmaceutical expenditures impoverish mostly people being already poor (indicator B).

According to the absolute poverty line, overall poverty in Poland decreased in this period. This fact is consistent with the indicators calculated on the national level. CSO (2009, 2) notes however, that the big drop in the absolute poverty headcount, which occurred in 2008, was a result not only of the improvement in the households financial situation, but also of lower than in 2005 and 2007 subsistence minimum estimated by the ILSS. In terms of the absolute poverty line, impoverishing impact of drug spending is declining during the period in question and it seems to be less of a problem than when taking into account the relative poverty.

Table 4. Impoverishing impact of out-of-pocket drug expenditures in Poland 2000-2009

	2000		2003		2005		2007		2009	
	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.
	395,8	312,4	444,4	354,8	511,4	385,1	552,1	386,3	695,4	424,7
Poverty headcount										
H^{pre}	15,5%	8,35%	17,34%	9,84%	16,6%	8,40%	17,42%	6,68%	15,7%	3,54%
H^{post}	19,3%	10,75%	19,92%	12,23%	19,4%	10,2%	21,39%	8,26%	20,6%	4,99%
$PI^{H}=$ $H^{post}-H^{pre}$	3,80%	2,40%	2,58%	2,39%	2,83%	1,79%	3,97%	1,58%	4,92%	1,45%
Poverty Gaps										
G^{pre}	15,92	6,21	21,04	8,93	24,23	8,68	24,84	5,97	27,5	3,59
G^{post}	21,24	9,02	26,61	12,06	30,21	11,24	32,78	8,30	38,2	5,78
$PI^{Gap}=$ $G^{post}-G^{pre}$	5,32	2,81	5,79	3,13	5,98	2,56	7,94	2,32	10,74	2,19
Normalized poverty gaps										
NG^{pre}	4,02%	1,99%	4,73%	2,52%	4,74%	2,25%	4,50%	1,55%	3,95%	0,85%
NG^{post}	5,37%	2,89%	5,99%	3,40%	5,91%	2,92%	5,94%	2,15%	5,49%	1,36%
PI^{NG}	1,34%	0,90%	1,30%	0,88%	1,17%	0,66%	1,44%	0,60%	1,54%	0,52%
A as % of (A+B+C)	75%	69%	78%	74%	80%	77%	76%	72%	72%	62%
B as % of (A+B+C)	19%	20%	17%	18%	16%	20%	19%	22%	20%	24%
C as % of (A+B+C)	6%	11%	5%	8%	4%	3%	5%	6%	8%	14%
B as % of (B+C)	77%	65%	77%	69%	78%	86%	79%	77%	70%	63%
C as % of (B+C)	23%	35%	23%	31%	22%	14%	21%	23%	30%	37%

To sum up, when looking at the normalized poverty indicators PI^{NG} in relative terms, impoverishing effect of drug expenditures increased, whilst according to the absolute poverty line, it declined.

Pen's Parades for each year can be found in the appendix (figure A-7).

4.3.3. Impact of OOP pharmaceutical expenditures on retired and chronically ill people.

After conducting the same procedure at the sub-sample consisting of observations for retired and chronically ill people, we obtained the following results:

Table 5. Incidence and intensity measures of OOP drug expenditures among retired and chronically ill people

		Headcount measures			Gap measures				
		H	H^w	C_e	O	O^w	C_o	MPO	MPO^w
2000	2,5%	68,57%	74,87%	-0,0918	5,19%	6,22%	-0,1990	7,57%	8,31%
	5%	46,48%	51,87%	-0,1159	3,76%	4,64%	-0,2349	8,09%	8,95%
	10%	21,74%	26,12%	-0,2011	2,15%	2,81%	-0,3041	9,90%	10,75%
	15%	10,56%	13,32%	-0,2607	1,40%	1,89%	-0,3536	13,24%	14,22%
2003	2,5%	77,16%	78,90%	-0,0225	5,57%	6,65%	-0,1941	7,22%	8,43%
	5%	55,89%	60,63%	-0,0848	3,93%	4,88%	-0,2429	7,02%	8,05%
	10%	26,74%	31,50%	-0,1781	1,93%	2,58%	-0,3367	7,23%	8,20%
	15%	13,76%	17,76%	-0,2906	0,99%	1,40%	-0,4056	7,21%	7,86%
2005	2,5%	71,19%	74,09%	-0,0407	5,34%	6,55%	-0,2274	7,50%	8,85%
	5%	52,06%	57,38%	-0,1021	3,81%	4,89%	-0,2840	7,31%	8,52%
	10%	25,11%	31,24%	-0,2441	1,97%	2,73%	-0,3881	7,83%	8,73%
	15%	11,74%	15,72%	-0,3395	1,09%	1,61%	-0,4729	9,32%	10,25%
2007	2,5%	78,98%	82,24%	-0,0412	5,62%	6,80%	-0,2107	7,12%	8,27%
	5%	59,83%	66,27%	-0,1075	3,90%	4,92%	-0,2609	6,52%	7,42%
	10%	28,07%	34,56%	-0,2309	1,85%	2,49%	-0,3448	6,61%	7,22%
	15%	13,54%	18,35%	-0,3546	0,90%	1,25%	-0,3800	6,66%	6,79%
2009	2,5%	80,14%	84,36%	-0,0527	8,20%	9,08%	-0,1063	10,24%	10,76%
	5%	60,74%	67,85%	-0,1170	6,46%	7,17%	-0,111	10,63%	10,57%
	10%	30,55%	37,55%	-0,2289	4,30%	4,58%	-0,0665	14,07%	12,21%
	15%	15,22%	19,81%	-0,3013	3,25%	3,20%	0,0159	21,37%	16,16%

At the first glance all of the measures increased considerably comparing to the outcomes from tables 2 and 3 where the whole sample was taken into account. Headcount ratios as well as the overshoots and MPOs are much higher in case of the currently investigated group. Thus, the catastrophic out-of-pocket expenditures are in fact more of a problem among retired and chronically ill people.

All of the concentration indices except for one are negative, implying that again the negative phenomena of catastrophic out-of-pocket drugs expenditure is

concentrated among the poorer part of the sub-sample. Since at 15% in 2009 the concentration index for overshoot is positive, the better-off tends to overshoot the highest threshold in the last investigated year. Moreover, if we take a closer look at the concentration indices we come to another conclusion. They are higher than those observed for the dataset as a whole. Therefore, although the catastrophic pharmaceutical spending occurs more often and is definitely more intense among currently investigated sub-sample, the concentration of it among the worse-off is less significant.

Another difference between table 5 and table 3 is that the MPO is no longer increasing with the thresholds for every year. The mean positive overshoot declines in 2003 and 2007, therefore it can be interpreted that at higher thresholds the incidence is more significant than the intensity for these two years.

Now let us move to the poverty investigation. First of all, compared to table 4, headcounts calculated pre-payment and post-payment are lower (table 6). However, if we look at the headcount poverty indicator PI^H, it is much higher especially for the relative poverty line. Therefore, although pre and post-payment headcount is lower, OOP expenditures impoverish larger percentage of the retired and chronically ill people than it occurs in case of the whole sample. The same can be observed for the poverty gaps.

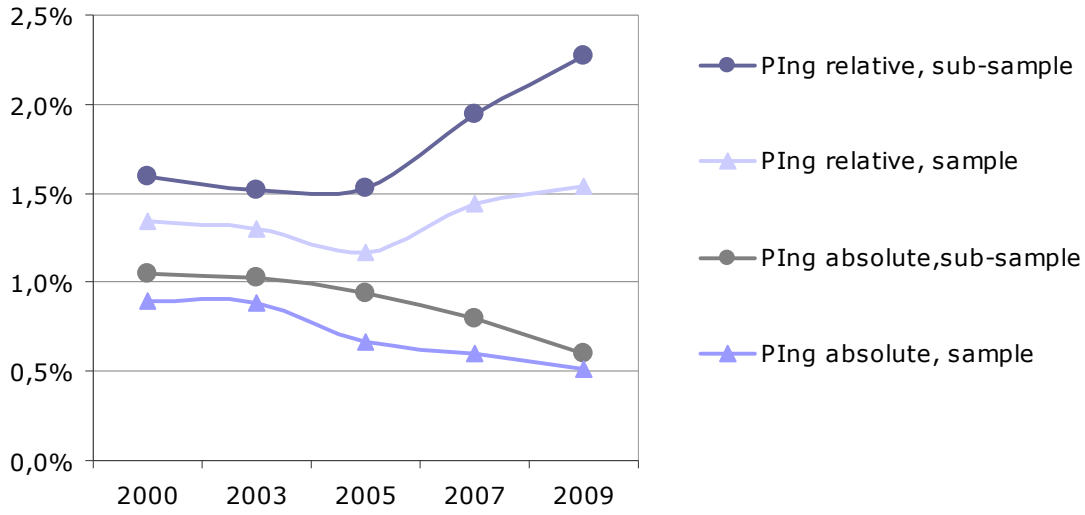
Across years, relative poverty caused by OOP spending increased, whilst absolute poverty declined. From the higher than in the previous table percentage values of B and C it is evident that retired and chronically ill people are more exposed to impoverishing payments. In 2000 and 2009 half of the group impoverished by drug expenditures is pushed further into poverty, whilst the other half was not poor before, but becomes poor after purchasing pharmaceuticals.

Table 6. Impoverishing impact of out-of-pocket drug expenditures among retired and chronically ill people

	2000		2003		2005		2007		2009	
	Rel.	Abs.	Rel.	Abs.	Rel.	Abs.	Rel.	Abs.	Rel.	Abs.
	395,8	312,4	444,4	354,8	511,4	385,1	552,1	386,3	695,4	424,7
Poverty headcount										
H^{pre}	13,07%	6,89%	14,81%	8,35%	13,10%	6,28%	16,08%	5,61%	15,67%	2,54%
H^{post}	18,06%	9,18%	19,32%	10,97%	17,71%	8,86%	21,86%	8,55%	23,44%	4,42%
$PI^{H}=H^{post}-H^{pre}$	4,99%	2,30%	4,50%	2,61%	4,62%	2,57%	5,78%	2,94%	7,77%	1,88%
Poverty Gaps										
G^{pre}	12,37	4,47	16,41	5,96	16,97	4,69	21,95	4,76	23,46	2,13
G^{post}	18,69	7,75	23,18	9,60	24,80	8,31	32,70	7,83	39,27	4,69
$PI^{Gap}=G^{post}-G^{pre}$	6,32	3,28	6,76	3,64	7,82	3,63	10,74	3,07	15,81	2,56
Normalized poverty gaps										
NG^{pre}	3,13%	1,43%	3,69%	1,68%	3,32%	1,22%	3,98%	1,23%	3,37%	0,50%
NG^{post}	4,72%	2,48%	5,22%	2,71%	4,85%	2,16%	5,92%	2,03%	5,65%	1,10%
PI^{NG}	1,60%	1,05%	1,52%	1,03%	1,53%	0,94%	1,95%	0,79%	2,27%	0,60%
A as % of (A+B+C)	66%	58%	71%	62%	68%	56%	67%	61%	60%	45%
B as % of (A+B+C)	23%	22%	21%	25%	21%	33%	23%	25%	26%	26%
C as % of (A+B+C)	11%	20%	8%	13%	10%	11%	10%	14%	14%	29%
B as % of (B+C)	68%	53%	71%	67%	67%	75%	70%	64%	64%	47%
C as % of (B+C)	32%	47%	29%	33%	33%	25%	30%	36%	36%	53%

To allow for more credible comparisons between the two samples, we need to look at the normalized poverty indicators:

Graph 6

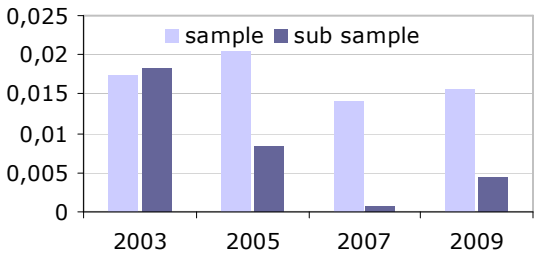


The graph confirms higher impoverishing impact of medicines spending on retired and chronically ill people than on the whole population. After 2005, both relative poverty lines start to increase dynamically, on a higher level for the sub-sample. Again, this can be the effect of the reimbursement lists reductions.

4.3.4. The problem of prescription drugs affordability.

This subsection presents descriptives of the variable concerning pharmaceuticals affordability. It is derived from the question asking if it happened over the last year that household did not have enough money to buy drugs prescribed by the doctor. Based on the survey we have the unique opportunity to investigate the incidence of not being able to afford the medical treatment in 2003, 2005, 2007 and 2009. Unfortunately, the variable had a different meaning in 2000, thus we excluded this dataset from this investigation.

Graph 7. Concentration indices, doctor's visits

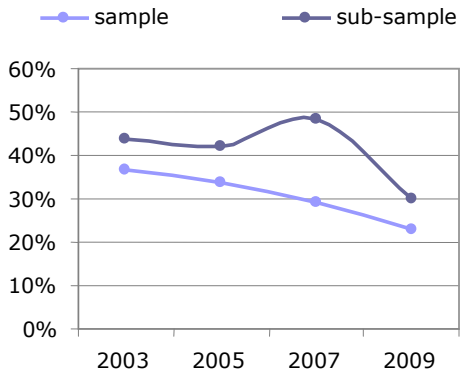


Firstly, we examined whether household individuals visited a doctor during the last year. 93-95% of the households total and 94-97% of the households of retired and chronically ill people did go to the doctor. Positive concentration indices

indicate that the doctor's visits are more concentrated among the better-off (graph 7).

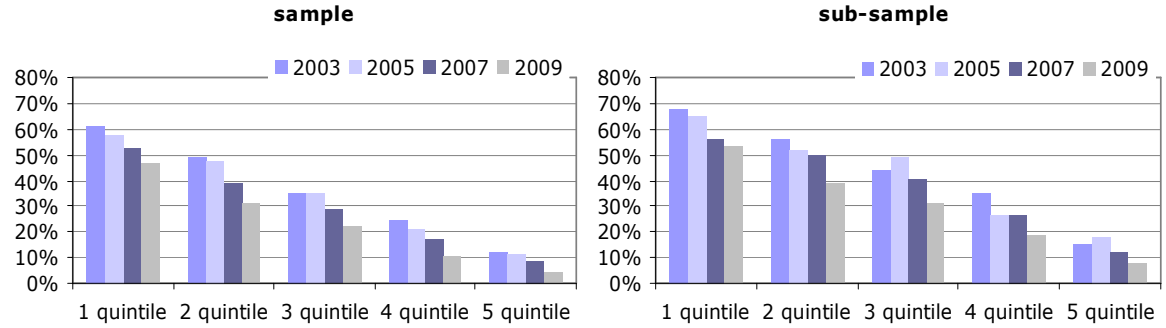
The percentage share of households that indeed were not able to afford drugs during the year in question is presented in the graph 8. The whole sample characterizes with a lower share of households that could not afford prescribed medicines than the group of retired and chronically ill inhabitants. However, both variables declined considerably during the investigated period (by around 13 percentage points).

Graph 8.



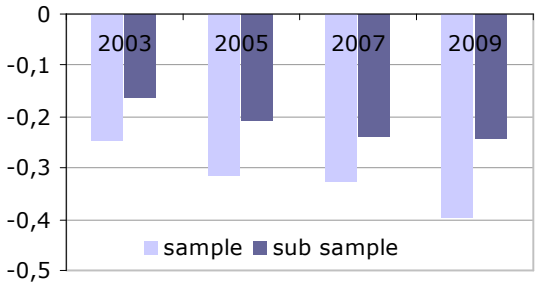
Graph 9 gives an overview of the issue by income quintile. 62% of the lowest income group of the sample and 68% of the sub-sample have the biggest problem with drugs affordability in 2000. In 2009 the share is lower and accounts for 47% and 54%, respectively.

Graph 9. Population unable to afford prescribed drugs by income quintile



The graph clearly indicates that for each income quintile in both groups the share of people who admit that their income was not enough to buy advised pharmaceuticals last year is falling. However, half of the lowest quintile still cannot afford them so the problem remains serious. The concentration indices of the variable in question are negative, thus they are consistent with the lowest income quintiles having problems with affording drugs. The problem is less concentrated amongst retired and chronically ill.

Graph 10. Concentration indices



5. Conclusions and discussion.

In the thesis we were trying to assess whether and to what extent pharmaceutical expenditures are a financial burden for households in Poland. In order to do that, we introduced two procedures. First one measures the financial burden of expenditures in terms of the drug spending exceeding a certain, pre-specified fraction of income. This is called the catastrophic approach. Second procedure looks at the income before and after incurring pharmaceutical expenses and compare it to the poverty line. This is the impoverishment approach. We have used the data for five years; 2000, 2003, 2005, 2007 and 2009 which allowed us to compare situation within almost a decade. As a living standard indicator we used income, and as the out-of-pocket expenditures – the variable answering question about how much the household spent on drugs during last three months.

First of all, after conducting the first procedure we found that the incidence of catastrophic drug expenditures in Poland after some fluctuations in 2005 increased, and in 2009 was higher than in the initial year for each threshold. The incidence was more stable, however it also rose. In addition, negative and declining concentration indices of both the incidence and intensity indicate that catastrophic OOP pharmaceutical spending is concentrated amongst the poor and it is becoming more serious over the years.

As for the impoverishment approach, we find that pharmaceutical spending do have an influence on the poverty level, however it is higher when we consider relative poverty line than when we analyze poverty in absolute terms. What is interesting, it

seems that poverty caused by drug expenditure is very stable across years. Moreover, we find that from 2000 to 2009 poverty in relative terms increases whilst absolute poverty decreases. Our analysis allows also to see whether poverty is a result of poor people getting poorer because of OOP spending or if it is the matter of people who were not poor before but they become, after facing high OOP expenditures on medicines. When considering relative poverty line, the pool of people crossing poverty line before the catastrophic OOP spending is larger than in terms of absolute poverty line. In absolute terms, the group of patients who was not poor but gets impoverished after drug spending is slightly higher than in case of the relative poverty.

We then conducted the same research on the sub-sample of retired an chronically ill people and found, as expected, that all the catastrophic indicators are higher than the ones we obtained for the whole sample. It means that depending on threshold and a year, the share of sub-sample incurring catastrophic pharmaceutical expenditures is on average higher by 5-17 percentage points than the share of the sample. What is interesting, in compare to the previous results, concentration indices are higher, indicating that excessive drug spending is less concentrated amongst poor households of retired and chronically ill inhabitants. This fact might explain our next finding.

Although pre and post-payment poverty headcounts obtained for the sub-sample are lower than in case of the whole sample, the difference between them is much higher especially in case of the relative poverty line. Therefore, OOP expenditures on pharmaceuticals impoverish larger percentage of the population of retired and chronically ill people. The lower headcount rates might be a result of the smaller concentration of OOP drug spending among poor people in the sub-sample. We also find that more people from the group of retired and ill who are not poor before buying medications, are exposed to poverty afterwards.

Finally we find that the sub-sample consisting of retired and chronically ill people have a bigger problem with drugs affordability than the sample as a whole. Although in both groups share of people who admit that their income was not enough to buy advised pharmaceuticals last year is declining, we find problematic

the fact that 50% of the sample from the lowest income quintile did not purchase prescribed medicines because lack of money.

To sum up; according to the calculations based on the catastrophic approach, pharmaceutical OOP expenditures can be considered catastrophic and overwhelming. In 2009 13% of households spent more than 15% of their income only on medications. The numbers are even higher when looking at the retired and chronically ill people. Not only are they more exposed to diseases, but also in most of the cases, their pensions are far too low to cover all of the medical needs. Calculations of concentration indices showed high inequality in financing the medicine expenditures, although more among the sample total. The worrying fact is that the concentration of the OOP payments on drugs among the worse off keeps deepening across years.

OOP expenditures on drugs influence poverty rates, however during period in question their level was stable. There was a slight increase in poverty assessed with a relative poverty line, and a slight decline in terms of absolute poverty. However, the problem with the absolute poverty line is that it is calculated based on a basket of goods and needs, coherently with the subsistence minimum conception. In 2008, there was a sudden drop in the value of the basket estimated by the ILSS, therefore declining absolute poverty may not be due to increasing wealth of households.

Households of retired and chronically ill inhabitants characterize with a lower level of poverty, but the difference between post-payment and pre-payment expenses on drugs is still higher among them than in the whole sample. Thus, we can say that the burden of high out-of-pocket spending can be more overwhelming for this economically and socially weaker group.

In each part of the investigation, there is break or change around year 2005. It is due to the health reform introducing National Health Fund which started in 2004. NHF's policy did not bring changes in sources of financing, but it influenced our area of interest by reimbursement list reductions. In search for savings, policy makers not only got rid of some medicines or changed to less incremental method

of refund, but also made an effort to reduce price differences between drugs belonging to one treatment group and forced patients to switch to cheaper, generic medicines. All those actions led to the considerable drop of the reimbursement.

However, as we discussed in the main text, high pharmaceutical OOP expenditures consist not only of the co-payment in Rx medicines, but also of the over-the-counter drugs. The increasing consumption of OTC medicines is caused by an easy, unlimited access to drugs through the pharmacies or the usual day to day grocery stores. On the one side we have a local pharmacy with a friendly pharmacologist or a grocery store visited on a daily basis and on the other hand – a visit in the doctor's office, which is hard to access, often expensive and time consuming. Another reason not to appoint a doctor is that in Poland public medical services are often filled with old-fashioned, underpaid employees who are not eager to treat patients with the proper respect and care. Visiting a private, market competitive clinic is very often the only way to have a positive experience with the medical care, however, it generates extra cost. Therefore people, led by a feeling or a partial knowledge (or influenced by a more colorful and entertaining commercial) buy medicines without the doctor's consultation trying to avoid doctor's visits. Another reason might be that people in Poland are becoming more and more wealthy and they do not mind spending money on the drugs which in their opinion are not harmful for their health and may prevent sickness or serve some other purpose, like loosing weight.

The matter of high and/or excessive pharmaceutical consumption in Poland is very uncommon and astonishing. Unfortunately, there is a definite lack of specific research in this subject area, not only on the national level. Poland is excluded from all of the internationally comparable surveys. The country did not participate in neither Demographic and Health Survey organized by the World Bank, nor World Health Survey conducted by WHO, not to mention other international programs. Therefore, there is a lack of publications which could compare Poland to other countries in the world in terms of catastrophic or impoverishing health or pharmaceutical spending.

6. References:

Database:

Rada Monitoringu Społecznego [2000-2009]. Diagnoza społeczna: zintegrowana baza danych [Social Diagnosis], www.diagnoza.com [November 2009]

- OECD Health Data 2008
- WHO *Statistical Information System*
- WHO: *Health for All database* [http://www.euro.who.int/hfadb].
- http://www.who.int/topics/pharmaceutical_products/en/

- Berki S. E., A Look at Catastrophic Medical Expenses and the Poor. *Health Affairs* 1986; 138–45.
- Central Statistical Office, Demographic Yearbook of Poland, 2009.
- Central Statistical Office, Wydatki gospodarstw domowych na ochronę zdrowia [Households expenditure on health care], (in:) Ochrona zdrowia w gospodarstwach domowych w 2006 r., Informacje i opracowania statystyczne, GUS, Warsaw 2007.
- Central Statistical Office, Budżety gospodarstw domowych w 2008 r. [Household budget surveys in 2008], Warsaw 2009.
- Desmond K., Rice T., Cubanski J., Neuman P., The Burden of Out-of-Pocket Health Spending Among Older Versus Younger Adults: Analysis from the Consumer Expenditure Survey, 1998-2003. The Henry J. Kaiser Family Foundation, September 2007.
- Dukes M.N.G., Haaijer-Ruskamp F.M., De Joncheere C.P., Rietveld A.H., *Drugs and Money. Prices, affordability and cost containment*., Published on behalf of the World Health Organization Regional Office for Europe by IOS Press, World Health Organization 2003.
- Gotsadze G., Zoidze A., Rukhadze N., Household catastrophic health expenditure: evidence from Georgia and its policy implications, BMC Health Services Research article, 2009.

- Health Care Systems In Transition: Poland, European Observatory on Health Care Systems, 1999.
- Health Care Systems In Transition: Poland, European Observatory on Health Care Systems, 2005.
- Kurowski P., Badania nad poziomem i strukturą zmodyfikowanego minimum egzystencji [Research on level and structure of the modified subsistence minimum], Institute of Labor and Social Studies, Warsaw 2009.
- Laskowska I., *Równość w finansowaniu i dostępności świadczeń medycznych*, [Equity of financing and access to health care] (in:) *Dane panelowe i modelowanie wielorównaniowe w badaniach ekonomicznych*, Wyd. Absolwent, Łódź 2000.
- Merlis M., *Family out-of-pocket spending for health services: a continuing source of financial insecurity*, Commonwealth Fund: New York, 2002.
- Mossialos E., Mrazek M., Wallet T., *Regulating pharmaceuticals in Europe. Striving for efficiency, equity and quality.* European Observatory on Health Systems and Policies Series, World Health Organization 2004.
- MZ (Ministerstwo Zdrowia) (2004), *Finansowanie ochrony zdrowia w Polsce – Zielona Księga* [Health Care Financing in Poland – the Green Book], Ministry of Health, Warsaw.
- MZ (Ministerstwo Zdrowia) (2008), *Finansowanie ochrony zdrowia w Polsce – Zielona Księga* [Health Care Financing in Poland – the Green Book], Ministry of Health, Warsaw.
- MZ (Ministerstwo Zdrowia) (2004), Polityka lekowa państwa 2004-2008 [Pharmaceutical Policy 2004-2008], Ministry of Health, Warsaw.
- Narodowy Program Zdrowia 2007-2015 [National Health Program], Zalacznik do Uchwaly Nr 90/2007 Rady Ministrow z dnia 15 maja 2007r.
- NFZ [NHF], Świadczenia opieki zdrowotnej finansowane ze środków publicznych Vademecum [Heath care benefits funded publicly], Warsaw 2010.
- O'Donnell O., van Doorslaer E., Rannan-Eliya R. P., Somanathan A., Garg C. G., Hanvoravongchai P., Huq M. N., Karan A., Leung G. M., Tin K., and Vasavid C., Explaining the Incidence of Catastrophic Payments for Health

Care: Comparative Evidence from Asia." EQUITAP Working Paper #5. Erasmus University, Rotterdam, Netherlands, and Institute of Policy Studies, Colombo, Sri Lanka, 2005.

- O'Donnell O., Van Doorslaer, E., Wagstaff A., Lindelow M., *Analyzing Health Equity Using Household Survey Data. A Guide to Techniques and Their Implementation*, The World Bank 2003.
- Paczkowska M., Korzystanie z leków i ich dostępność. Raport z badań [The use of pharmaceuticals and their availability], Warsaw 2008.
- Ryć K., Skrzypczak Z., *Jaka jest rzeczywista relacja wydatków na ochronę zdrowia do PKB?* [Health care expenditures to GDP] , (in:) Ryć K., Skrzypczak Z., *Ochrona zdrowia i gospodarka. Dylematy zarządzania*, Wydawnictwo Naukowe Wydziału Zarządzania UW, Warszawa 2006.
- Suchecka J., Laskowska I., Finansowanie świadczeń medycznych ze środków prywatnych w okresie transformacji systemu ochrony zdrowia w Polsce [Financing of health care in Poland during health system transformation], *Rozprawy Ubezpieczeniowe* nr 5 (2/2008).
- Suchecka J., Laskowska I., *Niektóre problemy pomiaru „sprawiedliwości" systemu zdrowia (mierniki oparte na krzywych koncentracji)*, [Some of the issues with measuring health care equity (measures based on concentration curves)] (in): Zeliaś A., *Przestrzenno-czasowe modelowanie i prognozowanie zjawisk gospodarczych*, Wydawnictwo AE w Krakowie, Kraków 1997.
- Suchecka J., Nierównomierności w finansowaniu i dostępności świadczeń medycznych [Inequities in financing and access to health care benefits], University of Lodz, 2008.
- UOKIK, Raport z badania rynku hurtowego obrotu lekami w Polsce [Report on wholesale market of pharmaceuticals in Poland], Polish Office of Competition and Consumer Protection, 2006.
- van Doorslaer E., O'Donnell O., Rannan-Eliya R. P., Somanathan A., Adhikari S. R., Akkazieva B., Harbianto D., Garg C. G., Hanvoravongchai P., Herrin A. N., Huq M. N., Ibragimova S., Karan A., Lee T.-j., Leung G. M., Lu J.-f.R., Ng C.-w., Pande B. R., Racelis R., Tao S., Tin K., Trisnantoro L., Vasavid C.,

Yang B.-m., and Zhao Y., Catastrophic Payments for Health Care in Asia. *Health Economics* 2007; 16: 1159–1184.

- Wagstaff A, Van Doorslaer E., Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–98. *Health Economics* 2003; 12: 921–934.
- Whitehead M, Dahlgren G, Evans T. Equity and health sector reforms: can low-income countries escape the medical poverty trap? *Lancet* 2001; 358(9284): 833–836.
- *Wprost 24*, „Polacy wydają miliard na leki" [*Wprost* magazine, "Poles spend billions on drugs"], 21.04.2007.
- Wyszewianski, L. Financially Catastrophic and High Cost Cases: Definitions, Distinctions and Their Implications for Policy Formulation. *Inquiry* 1986; 23(4): 382–94.
- Xu K, Evans D.E., Kawabate K. *et al*. Household catastrophic health expenditure: a multicountry analysis. *Lancet* 2003; 362: 111–117.
- Xu K., Saksena P., Carrin G., Jowett M., Kutzin J., Rurane A., Access to health care and the financial burden of out-of-pocket payments in Latvia. Technical briefs for policy makers, World Health Organisation, Geneva 2009

List of abbreviations:

CSO – Central Statistical Office in Poland

ILSS – Institute of Labor and Social Studies

OOP – out-of-pocket

OTC – over the counter medicines, pharmaceuticals sold without a prescription

Rx – prescription drugs

WHO – World Health Organization

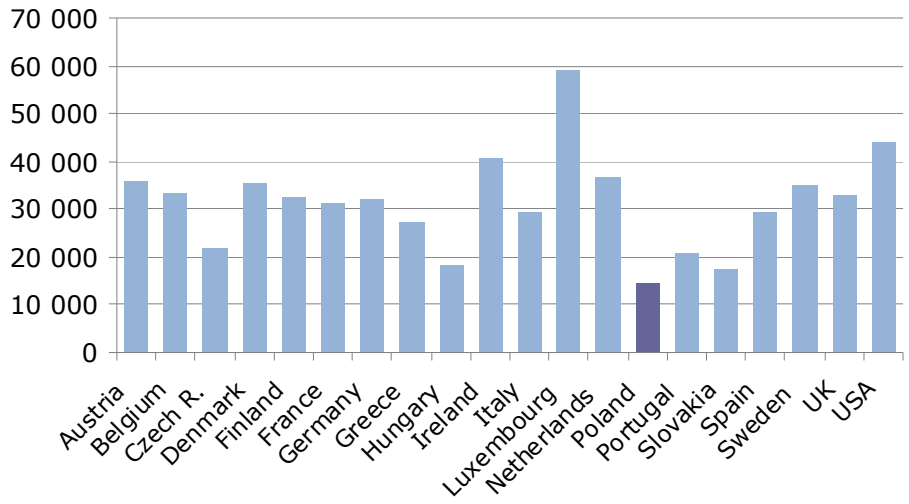
7. Appendix

Table A-1. Exchange rate: national currency (zloty) per US dollar

year	*2000*	*2003*	*2005*	*2007*	*2009*
US$ PPP	4,34607	3,88908	3,23548	2,76795	3,12014

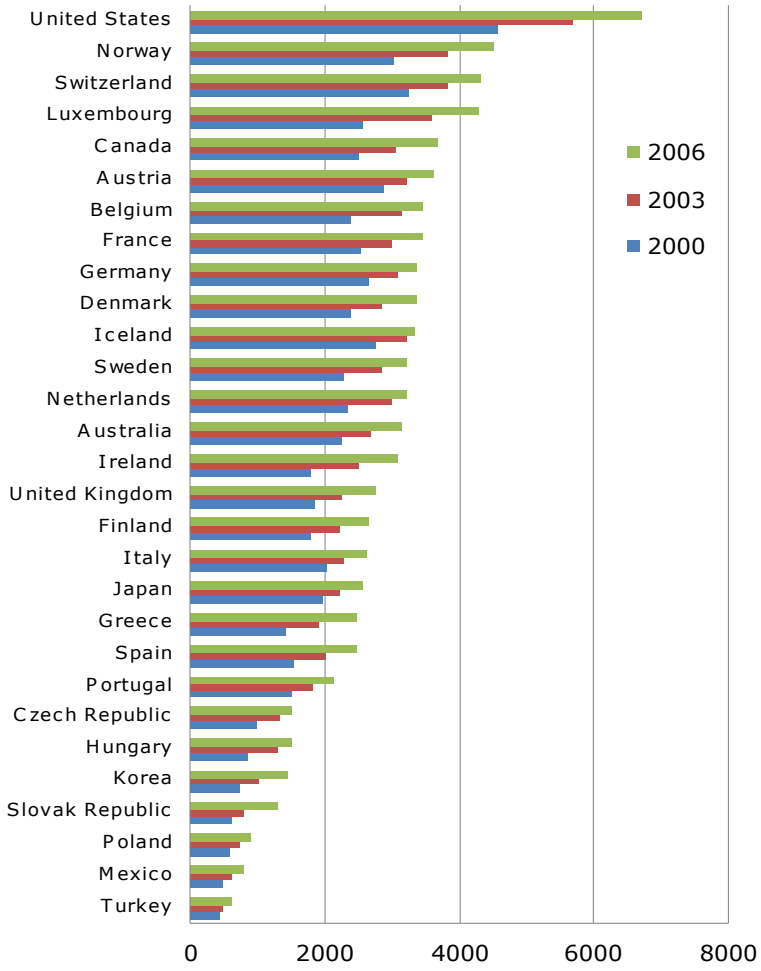
Source: http://stats.oecd.org/

Figure A-1. GDP per capita, US$ PPP



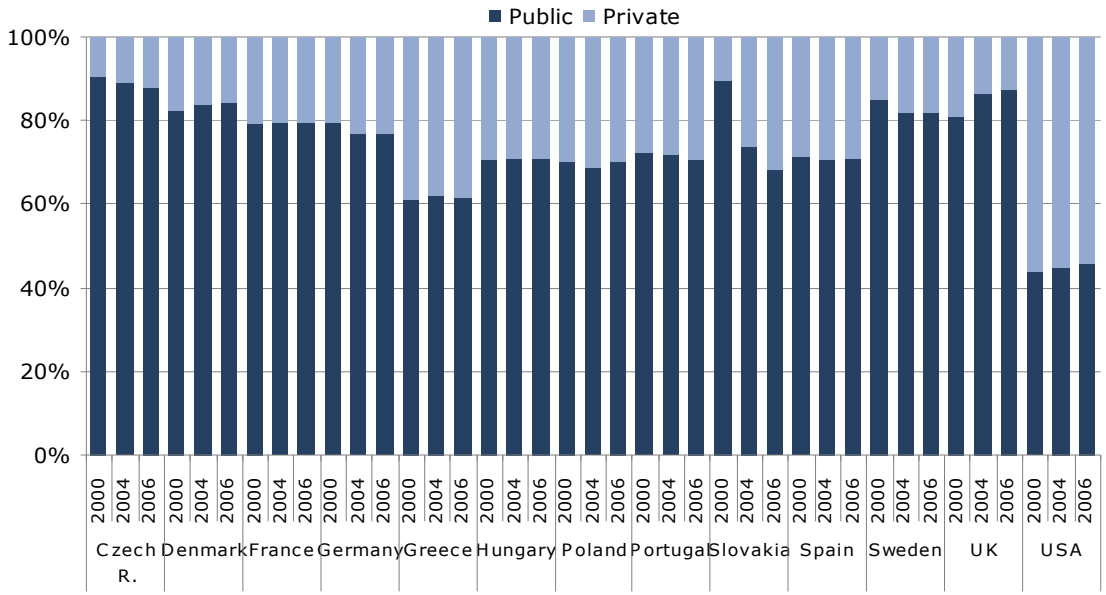
Source: OECD Heath data 2008

Figure A-2. Total expenditures on health per capita in US$ PPP



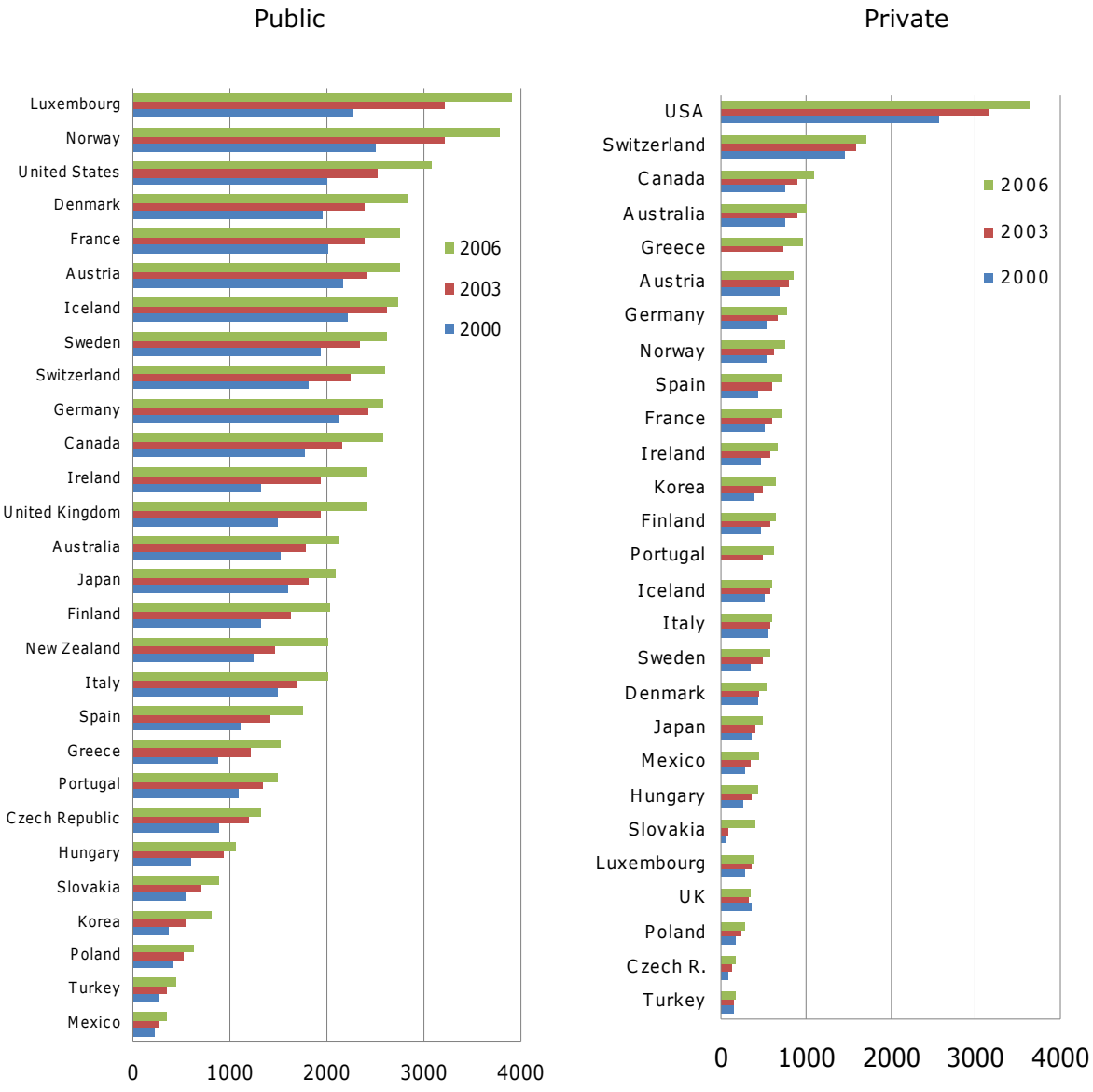
Source: OECD Heath data 2008

Figure A-3. Share of public and private expenditures in total health expenditures 2000-2006



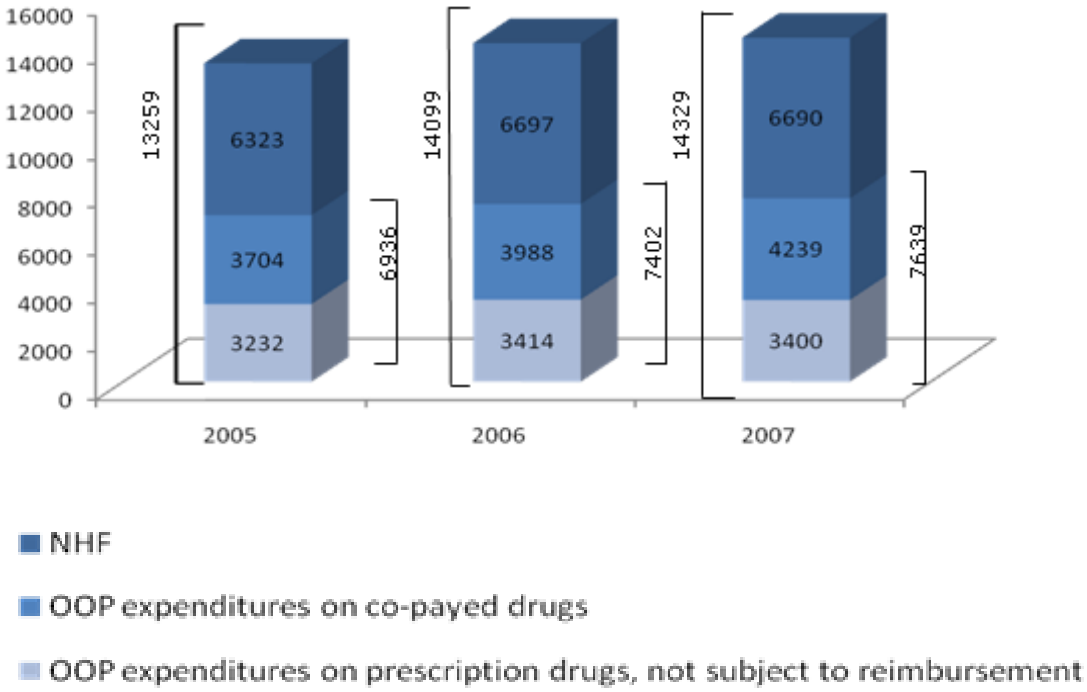
Source:OECD Heath data 2008

Figure A-4. Public and private expenditures on health per capita in US$ PPP



Source: OECD Heath data 2008

Figure A-5. Rx expenditures in Poland, million zlotys.



Source: Pharma Expert

Figure A-6. Overshoot and weighted overshoot (dotted line) measures (sample).

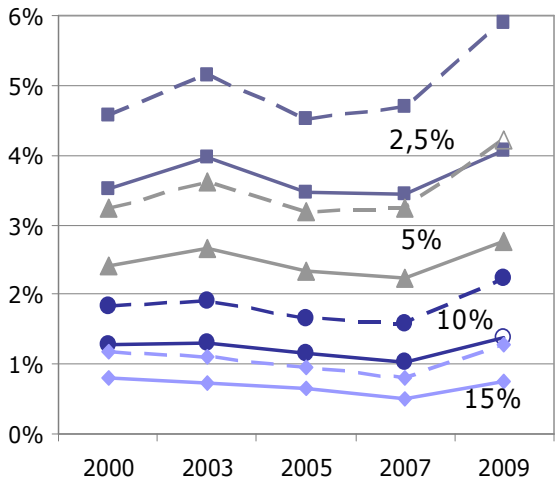


Figure A-7. Headcount and overshoot, sub-sample (weighted measures marked with dotted line)

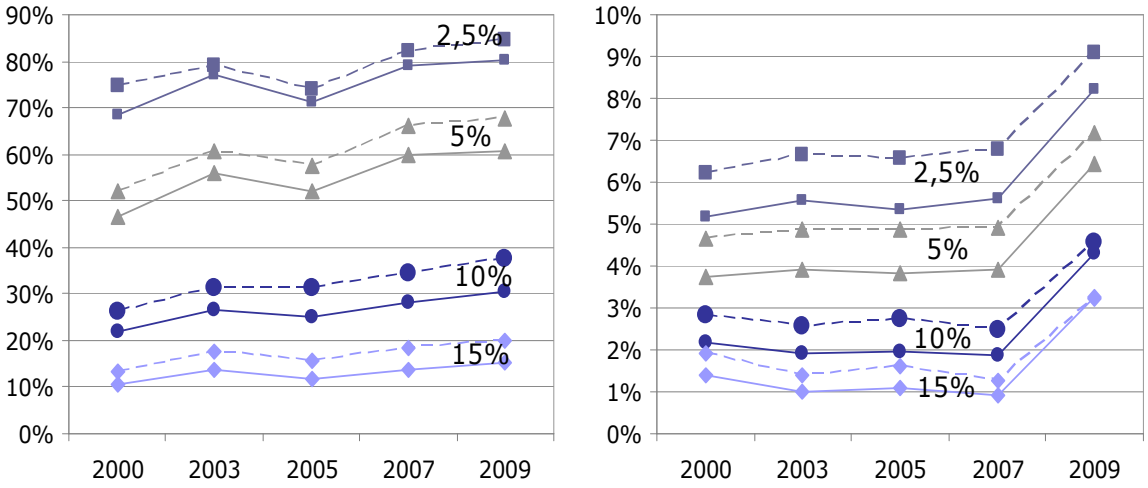


Figure A-8. Concentration curve for the sub-sample of retired and chronically ill people

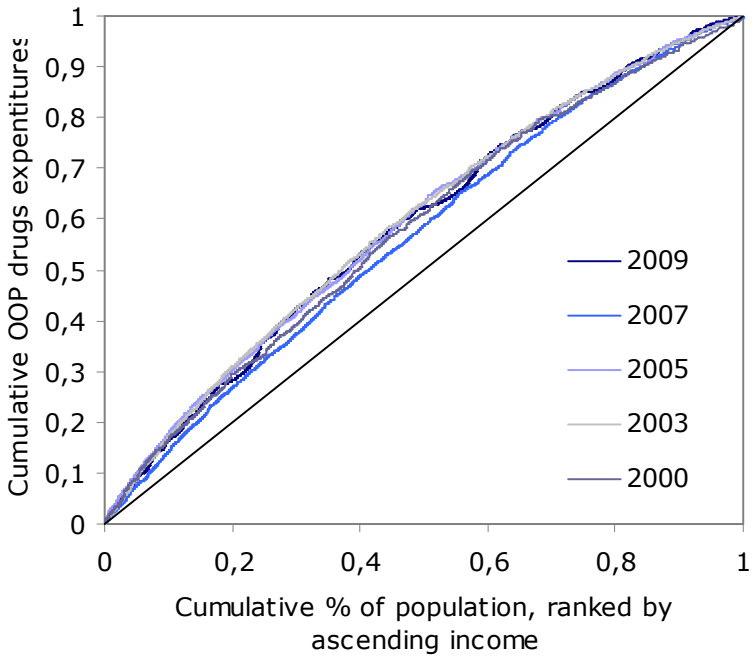
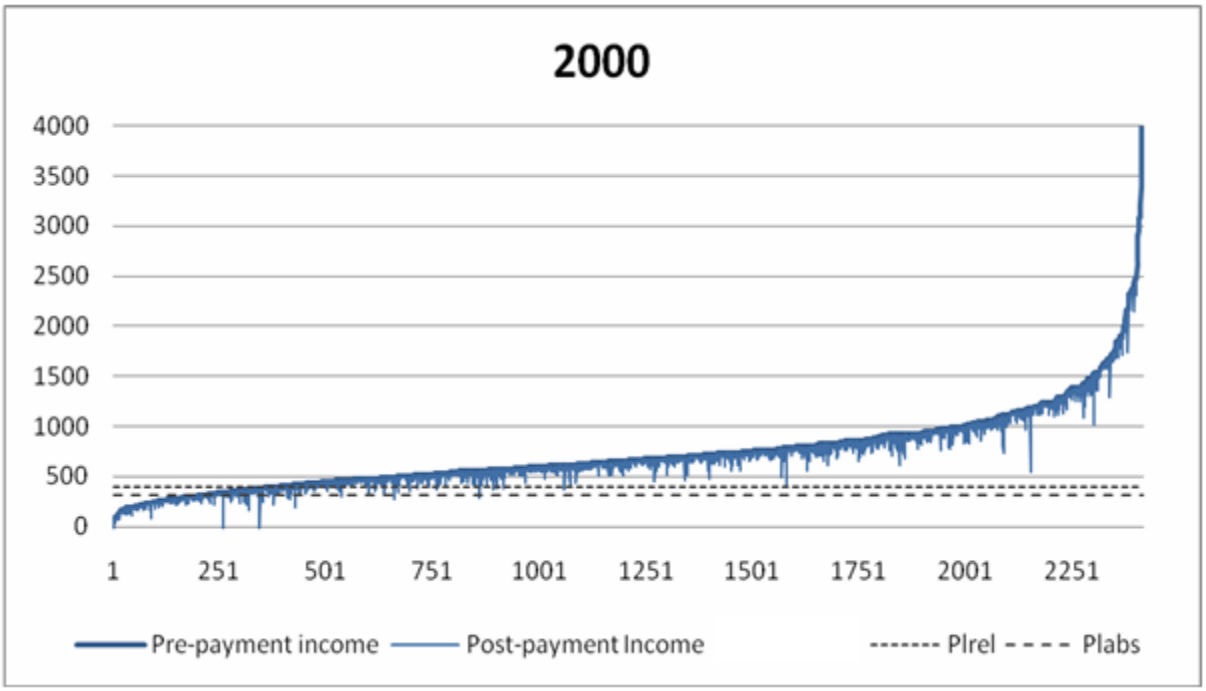
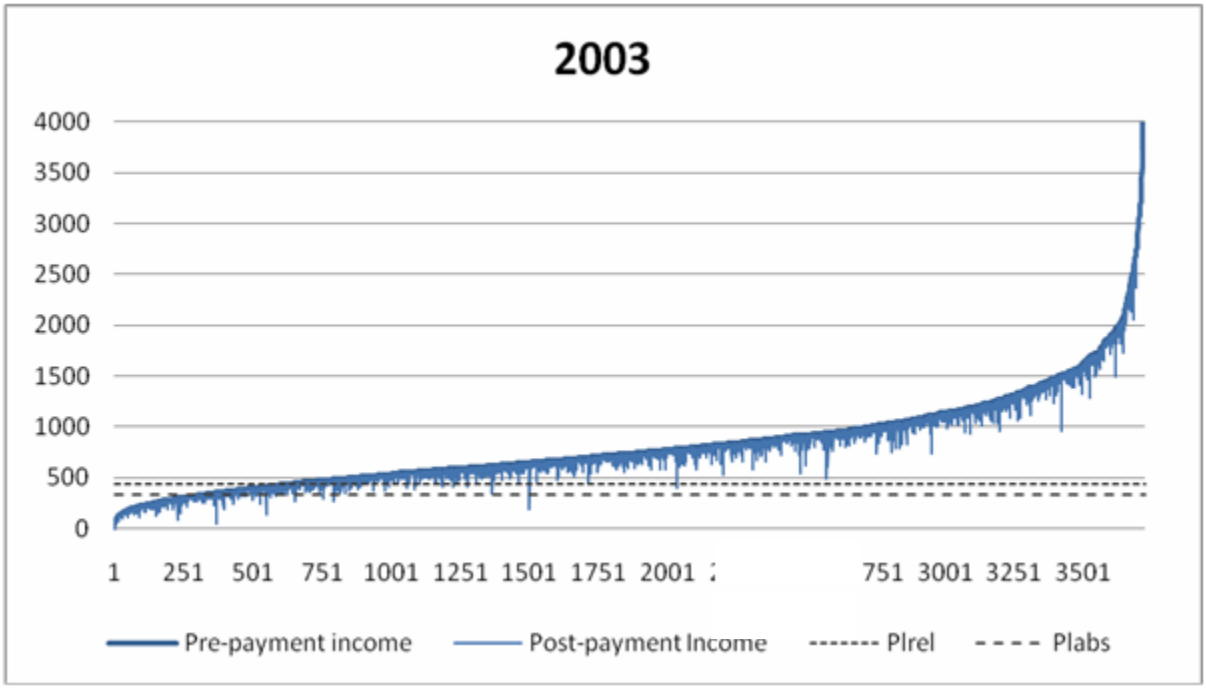
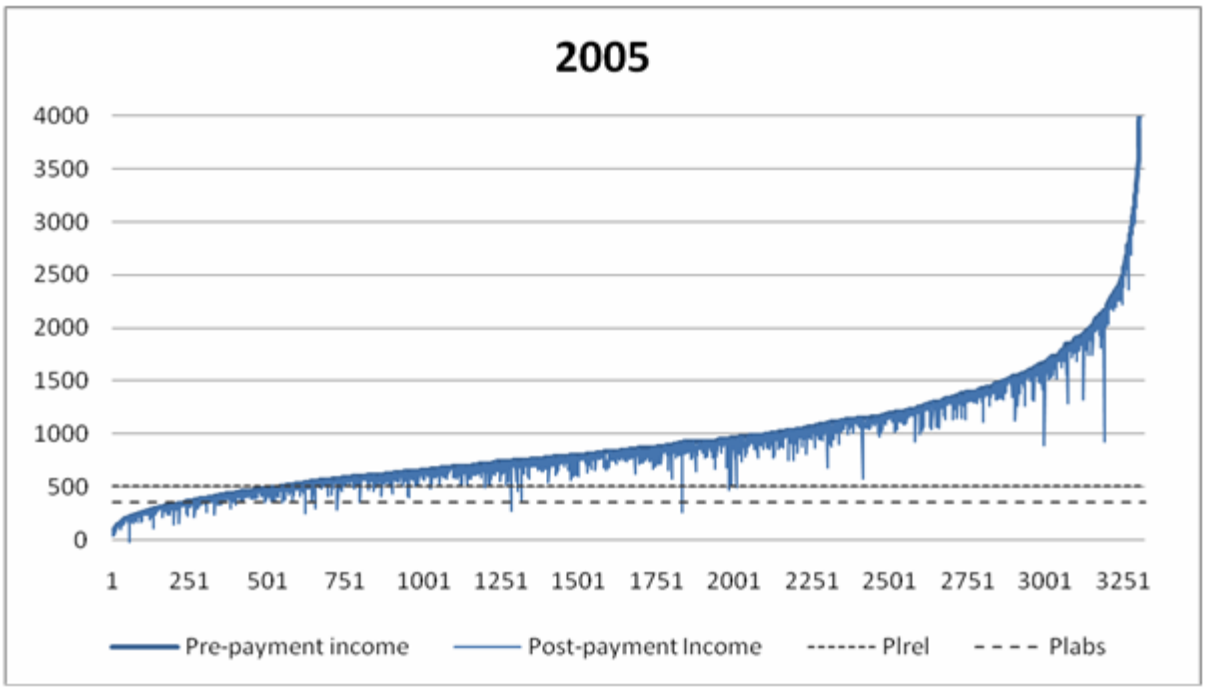
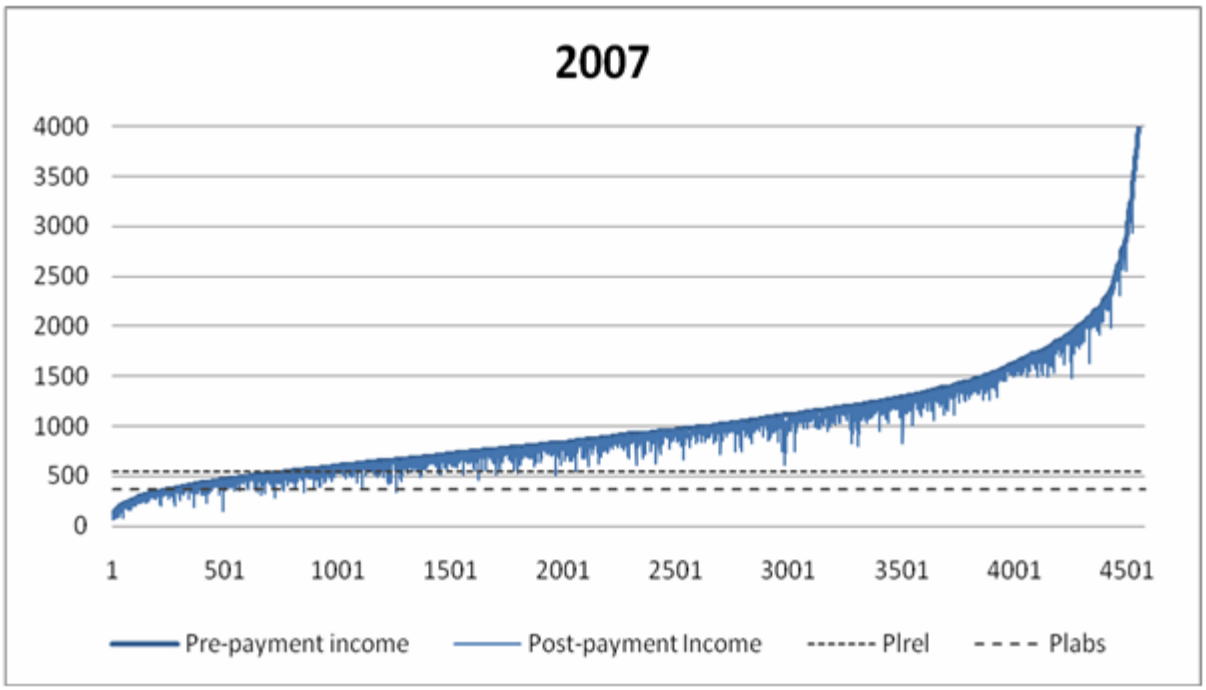


Figure A-9. Pen's Parades for each year, sample.






2005
4000
3500
3000
2500
2000
1500
1000
500
0
1
251
501
751
1001
1251
1501
1751
2001
2251
2501
2751
3001
3251
Pre-payment income
Post-payment Income
Plrel
Plabs


2007
4000
3500
3000
2500
2000
1500
1000
500
0
1
501
1001
1501
2001
2501
3001
3501
4001
4501
Pre-payment income
Post-payment Income
Plrel
Plabs

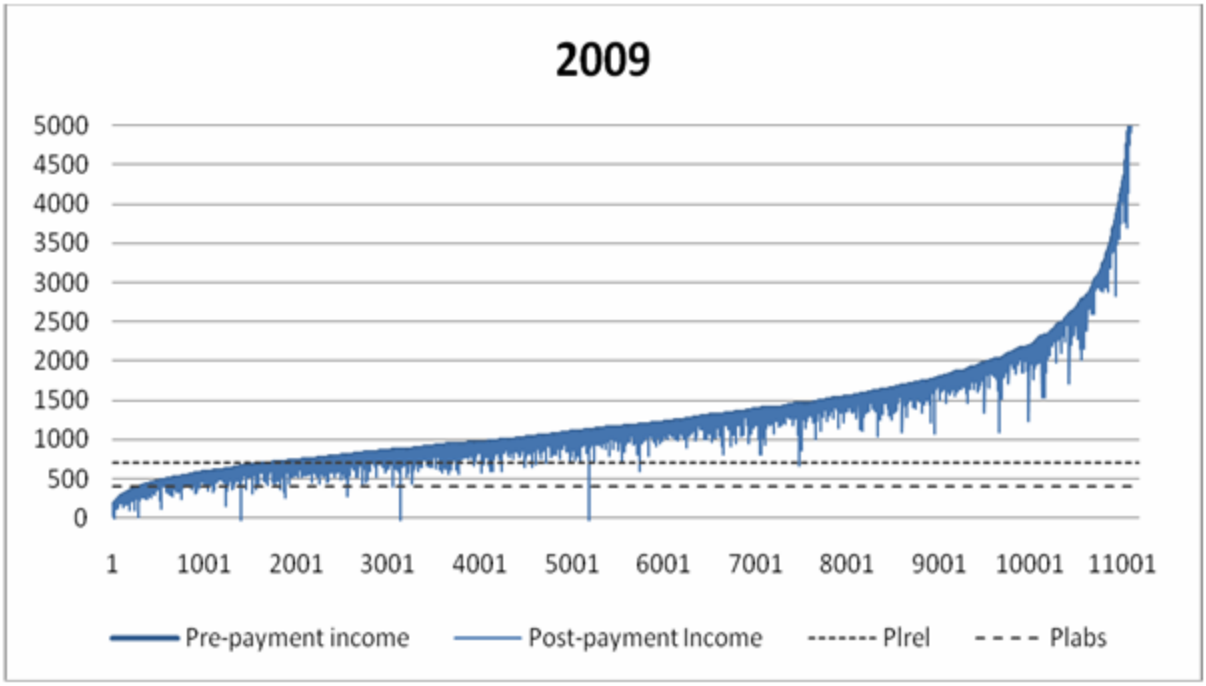
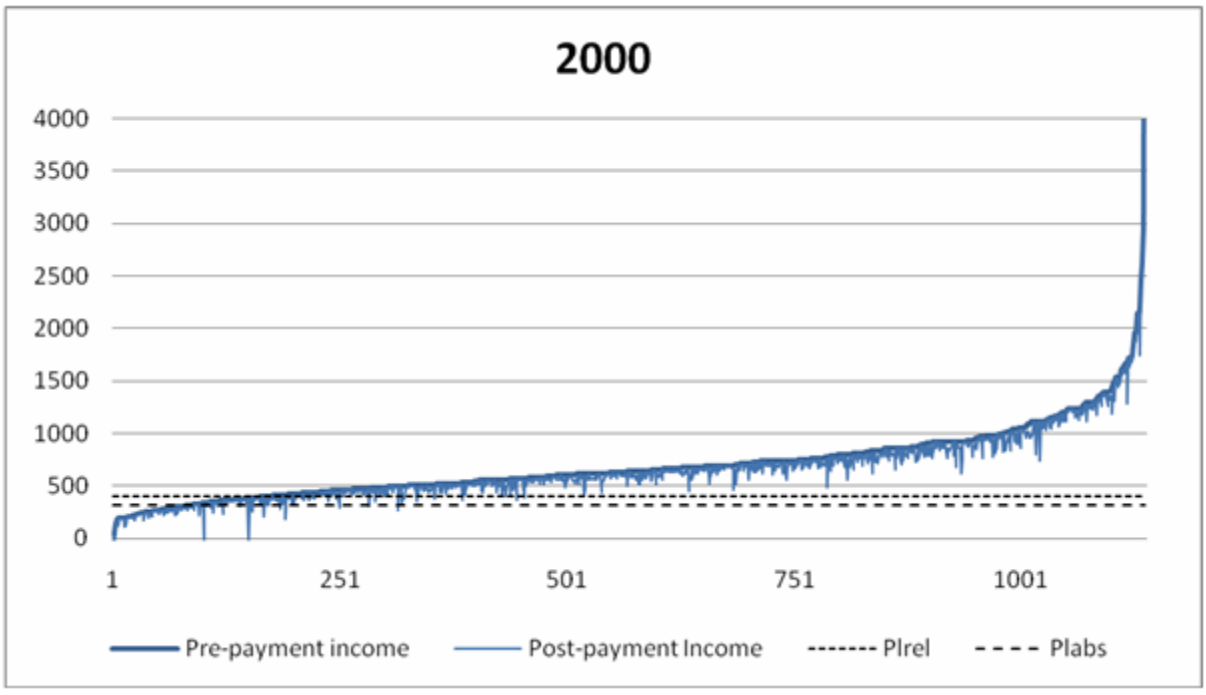
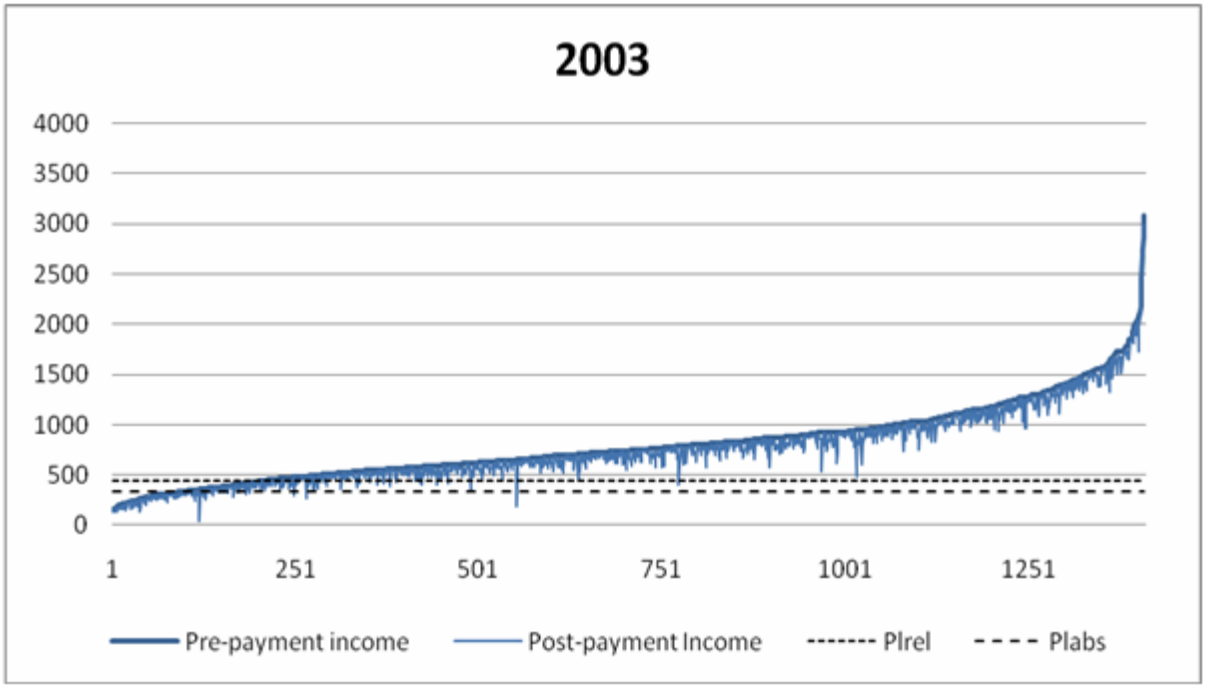
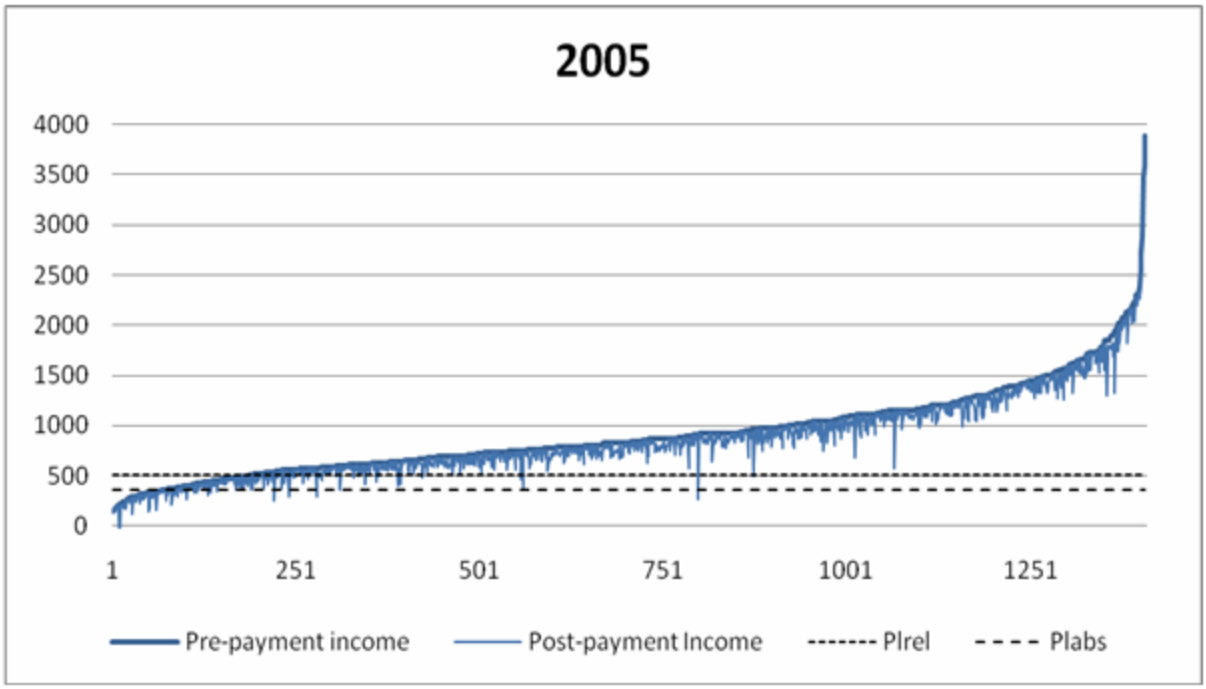
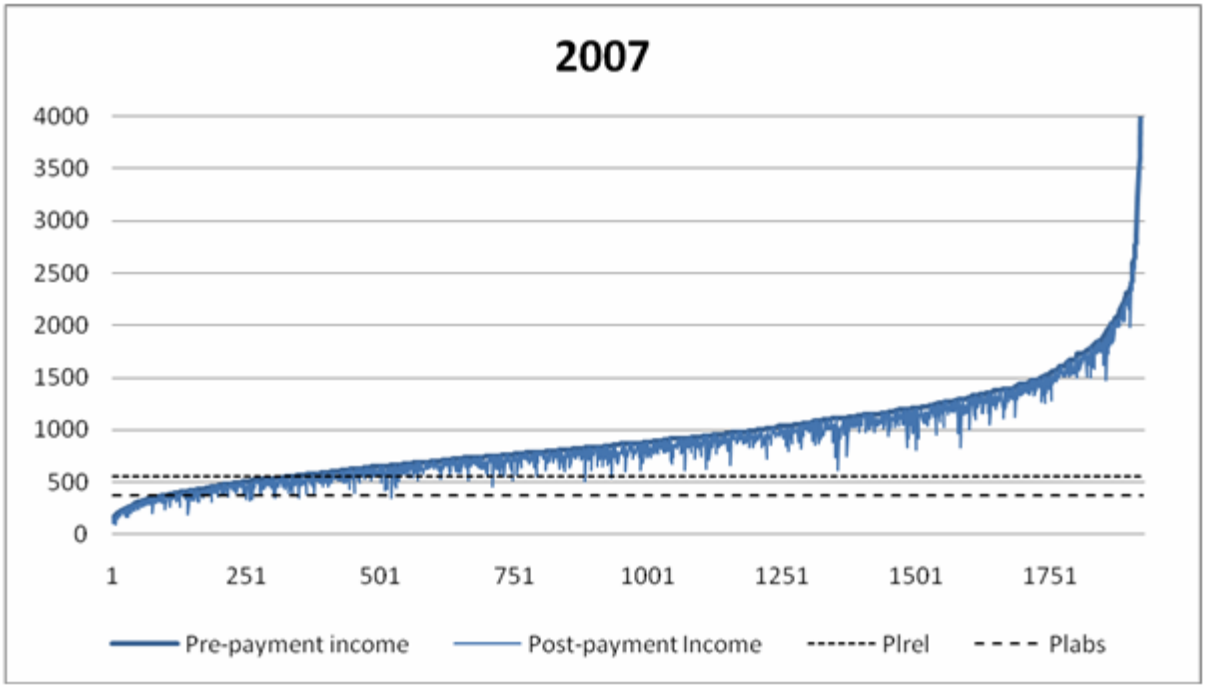


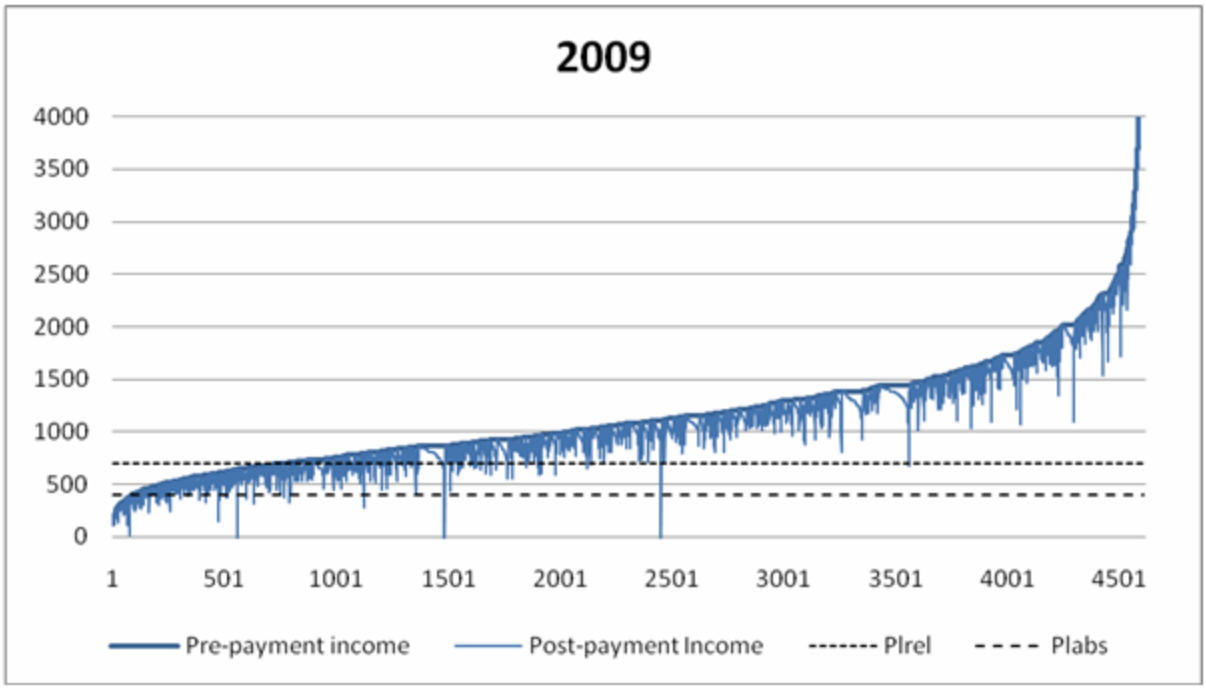
Figure A-10. Pen's Parades for each year, sub-sample.




2003
4000
3500
3000
2500
2000
1500
1000
500
0
1
251
501
751
1001
1251
Pre-payment income
Post-payment Income
Plrel
Plabs


2005
4000
3500
3000
2500
2000
1500
1000
500
0
1
251
501
751
1001
1251
Pre-payment income
Post-payment Income
Plrel
Plabs


2007
4000
3500
3000
2500
2000
1500
1000
500
0
1
251
501
751
1001
1251
1501
1751
Pre-payment income
Post-payment Income
Plrel
Plabs


2009
4000
3500
3000
2500
2000
1500
1000
500
0
1
501
1001
1501
2001
2501
3001
3501
4001
4501
Pre-payment income
Post-payment Income
Plrel
Plabs