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DIPLOMOVÁ PRÁCE

Microeconomic Analysis of Demand for Health Care under Publicly Financed Health Care Insurance - The Model of Effective Demand

Mikroekonomická analýza poptávky po zdravotní péči v prostředí veřejného zdravotního pojištění - Model efektivní poptávky

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Prohlášení

Prohlašuji, že jsem diplomovou práci vypracovala samostatně a použila pouze uvedené prameny a literaturu.

Except where reference is made to the work of others, the work described in this thesis is my own or was done in collaboration with my thesis supervisor.

V Praze dne 17.1.2005

Poděkování

Poděkování patří především mému konzultantovi Ing., MPhil. Ondřeji Schneiderovi, PhD. za jeho cenné připomínky a vůbec za to, že mne na téma ekonomie zdravotnictví navedl, dále pak mým spolupracovníkům z Ministerstva financí ČR za vytvoření mnoha velmi inspirujících příležitostí a také mým blízkým, kteří se mnou měli velkou trpělivost.

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Abstrakt

Cílem práce je na základě mikroekonomické analýzy poptávky po zdravotní péči navrhnout model, který by umožnil popsat a vysvětlit trhy zdravotních služeb v Evropských zemích, které se vyznačují velkou nespokojeností společnosti s jejich současným stavem.

Práce navrhuje model efektivní poptávky po zdravotní péči jako nástroj, který je schopen ukázat, že trh zdravotních služeb s veřejně financovaným zdravotním pojištěním vede ke ztrátě spotřebitelského přebytku a tím i k úbytku společenského blahobytu. Tato ztráta přitom není způsobena tržními nedokonalostmi, ale racionálním chováním spotřebitelů zdravotních služeb maximalizujících svůj užitek za přítomnosti třetí strany jako plátce. Jako měřítko je zvolen hypotetický konkurenční trh zdravotních služeb bez existence pojištění. Zároveň je navržena funkce společenského blahobytu, kterou lze použít v případě zdravotní péče a která kromě efektivnostního hlediska zahrnuje i existenci externalit, a to jak ‚ochranných', tak externalit ‚starostlivosti' týkajících se evropských společenských hodnot souvisejících se společenskou solidaritou.

V práci je ukázáno, že zavedení přiměřených přímých plateb spotřebitelů za zdravotní péči jako doplněk k všeobecnému veřejnému zdravotnímu pojištění vede ke snížení ztráty spotřebitelského přebytku, a implicitně tak ke zvýšení společenského blahobytu, a to i v případě započítání nepříznivého snížení užitku z externalit.

V neposlední řadě se v práci ukazuje, že zavedení (regulované) konkurence na trhu zdravotního pojištění může přispět ke zvýšení efektivnosti celého systému. Model efektivní poptávky po zdravotní péči tak teoreticky vysvětluje současný trend v Evropské zdravotní politice.

Abstract

The objective of the thesis is to propose, based on microeconomic analysis of demand for health care, a model that would enable us to describe and explain markets for health care services in European countries that are characterized by society's important discontent over their current state.

The thesis proposes a model of effective demand for health care as an instrument to show that market for health care services with publicly funded health care insurance leads to a loss of consumers' surplus and therefore also to a decrease in social welfare. Still and all, this loss is not caused by market imperfections, but by rational behavior of health care consumers who maximize their private utility in the presence of a third-party payer. As a benchmark a hypothetical competitive market for health care services without insurance existence is chosen. At the same time, there is proposed a social welfare function, which can be used in case of health care good and which includes, next to the efficiency point of view, also the existence of externalities, both 'safety' and 'caring' that concerns European social values related to social solidarity.

In the thesis it is demonstrated that introduction of moderate direct payments of consumers for health care services as a complement to publicly funded health care insurance leads to a decrease in loss of consumers' surplus, and thus implicitly to increase in social welfare, even if controlling for unfavorable decrease of utility from externalities.

Last but not least, the thesis shows that introduction of (regulated) competition on market for health care insurance can contribute to an increase in efficiency of the whole system. The model of effective demand for health care thus theoretically explains the current trend in European health policy.

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"Demonstrating that a [health care] market fails is not a sufficient justification for government intervention. Government can also fail. In a second-best world, a non-optimal market allocation may be preferred to the best possible allocation under government intervention."

- Hurley (2000), p. 62

Introduction

Health care is a very specific good where insurance plays a crucial role. In general, there is no single health care system in the world that could be regarded as functioning properly. Nevertheless, we still have to deal with them and with all kinds of imperfections that their markets reveal. Such imperfections concern information asymmetry on different segments of the market, adverse selection, moral hazard, demand inducement, presence of externality, and so on. Some of these imperfections are typical of any insurance system; however they are multiplied by the others in case of health care.

A quick response to market failures used to be a state intervention. This may explain, why in virtually every advanced economy the majority of health care expenditures is financed from public purse either explicitly or through tax expenditures such as the exemption of health care benefits from taxable income (OECD, 2004). Moreover, state intervention does not limit itself only to financing of health care, as in many countries the organization and provision of health care is also under strong state regulation, if not even fully publicly provided (Hurley, 2000).

The objective of this thesis is to explore, within a theoretical model, health care systems of European countries, which are in general publicly funded, and their impact on social utility. By a publicly funded health care system this thesis means a system where health care insurance is mandatory and contributions are not based on individual risks (as is the case of any other insurance system), but on an individual ability to pay.

The main hypothesis of this work is that health care systems with publicly funded insurance system providing for a first-dollar health care coverage create an important social welfare loss. Moreover, it is presumed that efficiency of such a health care system can be improved by introducing some demand rationing measures, such as direct co-payments at the point of use or introduction of a time constraint.

These hypotheses are tested using the model of effective demand for health care, which the author develops throughout the thesis. The model stands on the fact that though in health care economics literature each segment of health care sector is usually treated separately, they are so interconnected that we can in fact model them in a one single graph.

The main method used when building the model is the microeconomic analysis applied to health care economics issues; the thesis treats especially the demand side of the health care market. The approach is within the neoclassical welfare economics framework standing on utility maximization, individual sovereignty, consequentialism, and welfarism. As cornerstones, the individualistic social welfare function is taken and the Potential-Pareto-Improvement criterion is used[1]. Furthermore, justified by the two fundamental welfare theorems, a perfectly competitive market allocation (with no insurance present) serves as the reference standard when measuring the size of dead weight loss of health care markets with publicly funded insurance systems.

However, since the loss of social welfare caused by publicly funded health care systems in terms of dead weight loss seems so important, it made the author to consider also other utility aspects, besides the standard consumer and producer surplus, that may play an important role when deciding about health care system organization. Therefore, notions of externality, both 'safety' (or 'physical health') and 'caring', are added and observed throughout all comparative static analyses. The 'caring' externality refers to the conception of 'social solidarity', which is a term used in health care economics to address societies' concerns about access to and equity in health care provided to their members.

Nevertheless, it is important to note that despite such extended perception of social utility, no space in the thesis, due to its limited extent, is devoted to public choice and aggregation of individual preferences. The analysis of the model of effective demand for health care stands on aggregation of individual demands, and not on aggregation of individual preferences[2].

[1] Also called the compensation test or the Kaldor-Hicks criterion: "A policy is said to produce a Potential Pareto Improvement, if benefits that accrue to the gainers are sufficiently large to enable them (hypothetically) to compensate the losers, making the losers no worse off than they were before the policy, while still retaining some net benefit for gainers." (Hurley, 2000, p. 61)

[2] Although public choice would constitute a useful extension of the model of effective demand, at the moment it goes behind the scope of the content of this thesis.

The thesis starts by modeling a perfect market for health care, with no insurance in place, that serves as a benchmark in following chapters. Still in the first part, imperfections of health care market are explored in order to understand why a voluntary health care insurance system cannot work, or, better, why it cannot work to a society's full satisfaction. The concept of social solidarity on three levels is introduced. The first part then concludes by developing a social welfare function applicable to health care, which captures the neoclassical perception of market agents' utility based on theory of consumers' surplus and also includes variables addressing the 'safety' externality issue as well as social solidarity in health care.

In part 2 of the thesis, the emphasis is given on demand for health care. The first chapter concentrates on individual preferences and utility from health care consumption while bearing in mind that demand for health care is only a derived demand from demand for health. Arguments are then given in favor of existence of an individual point of saturation concerning personal health care needs (given individual's imperfect information and knowledge). Because this point is deduced from individual preferences, it is a very subjective thing.

In the third chapter of part 2 we finally get to the model of effective demand. With the help of graphical illustration it is shown that a publicly funded health care insurance system with first-dollar coverage creates an important dead weight loss on market for health care. The distribution of this welfare loss between consumers and supply side agents is discussed. Under the condition that in the system there are sufficient financial means to cover to its full extent the demanded quantity of health care for required price, it is realized that there are consumers, i.e. clients of health care system, who in fact bear the whole social welfare loss and also something on the top of it. The chapter then continues by exploring effects of moral hazard and supplier-induced demand phenomenon on health care market welfare outcome.

In the fourth chapter of part 2, two exogenous factors are explored within the model of effective health care demand framework. These are increase in social wellbeing and medical technology progress. While the effect of increased income is found to have an unclear impact on social welfare in terms of the dead weight loss (depending on the exact price elasticities of demand and supply curves and, moreover, on the sensitivity of individuals' health care bliss points to changes in respective social statuses), the medical technology progress is shown as to increase the size of the welfare dead weight loss.

The fifth chapter then treats means of health care demand regulation, i.e. ways how health care demand can be rationed in order to not only decrease the overall health care spendings, but also to reduce the dead weight loss and increase efficiency. The case of out-of-pocket payments, with distinction between proportional and fixed, is examined with quite optimistic results. According to the model of effective demand, it seems that abandoning a health care insurance system with first-dollar coverage and setting some moderate direct payments may lead, ceteris paribus, to a significant decrease in dead weight loss and thus to an increase in social welfare via improved system's efficiency. In addition, the question of social welfare in terms of social solidarity is also posed. Nevertheless, it proves that there would probably still rest a welfare gain from such a measure introduction, even when taking account of negative changes in social solidarity and externality treatment.

Another means of demand rationing is introduction of waiting times. These may represent an implicit price of health care to some society's members through setting a hard time constraint. Besides discussing the impact of this regulation proposition on social welfare via changes in dead weight loss, the issue of unequal affect of this measure across a society is also brought to attention.

In the last part of this thesis, part 3, the extension of the model of effective demand for health care is presented in three chapters. This part is also the one that sets the most fruitful basis for future research, as topics covered in its chapters are only a sample of all the issues that rest 'untouched' in this particular field. The subject of interest of this part concerns supply side of a health care market, that is the providers of health care and the insurance funds, as these serve as payers/purchasers of health care, but at the same time they offer their insurance services in association with health care market. Thus, distinction is being made between providers and purchasers of health care. The insurance funds are on purpose called purchasers of health care to highlight the difference compared to integrated health care systems where there is only one national authority (though often called also a 'fund'), who in fact serves only as a health care payer.

In the first two chapters of part 3 the thesis treats matters of administrative regulation of providers of health care by insurance funds. The aim is to bring the model of effective demand closer to what actually happens on European health care markets. It is shown that by incorporating the proposed administrative regulations into the model, we get quite a realistic situation concerning the outcome measured also in terms of (dis)satisfaction

of each of market agents' side. First, the welfare implication of setting a price limit on reimbursement of provided health care is specified. In the second chapter the quantity limits, i.e. caps on reimbursed volume of health care, are added to analysis. In all of these model situations we assume that originally the whole quantity of health care demanded was provided and consumed for required price, i.e. that there were sufficient financial means in the system to cover it. Besides overall social welfare implications, the distribution of surplus between consumers and providers is also discussed.

The last chapter of part 3 then concentrates on health care insurance funds competition and hypothesis of resulting increased competition also among providers of health care. Such development is also integrated into the model of effective demand, thus completing the objective of the author to show that it is possible to catch the notion of European publicly financed health care systems and their (in)efficiency within a simple framework, based on microeconomic analysis of rational behavior of different market agents.

Part 1 : Health Care Market

There is a full scale of market failures (though health care is not a public good) which constitute an important argument for state regulation of health care systems. European countries have for the main part historically given publicly funded health care systems that enable them to deal with health care market imperfections, as well as to address some social values that they regard as important[3].

To be able to review in later parts of this thesis the properties of publicly funded health care systems, we need to have some comparative benchmark at our disposal. That's why we start this part by assuming a "perfect" market for health care in terms of a market where market-clearing price is reached and no dead weight loss from trade is acquired. Even on such a market, however, one would suppose that some health care insurance system must emerge, as people are generally risk averse. Nevertheless, we will see that thanks to asymmetry of information between an insurer and a potential policy holder at one hand, or adverse selection at the other, it is not possible to reach a stable, market-clearing, and socially 'optimal' equilibrium on a voluntarily based health care insurance market.

Besides asymmetry of information and adverse selection, there is also one other market failure that relates (in this case directly) to health care market (and not to the associated insurance system). It is the externality feature of a health care good, which may be in some cases positive and in some negative[4].

Both of these types of market failures, as we will further see, may explain why European countries have chosen for their health care sectors a publicly funded health care insurance system granting an access to health services to all their citizens.

Furthermore, health care is not only about efficiency and markets, but values play an extremely important function for European societies as well. Hence, when analyzing a health care market setting, one has to take in account also some essential social values, upon which current health care systems, together with their associated insurance systems, are built, and that influence the overall utility of a modern society.

[3] Health care insurance is mandatory in all the EU Member States. In almost all Member States, the coverage of public health insurance schemes is universal, with almost 100% of population being eligible (European Commission, 2004).

[4] More detailed elaboration and definitions will be provided further in the text.

The first part of this thesis treats all of the above mentioned issues and by its end it presents a social welfare function, which will be then used in next chapters to assess different regulating propositions for publicly funded health care sectors.

1.1 Modeling a perfect market for health care

Let us in this chapter assume that there are perfectly informed and fully knowledgeable consumers who seek a good called health care on a perfectly competitive market of care providers. It is worth noting that health care itself doesn't have a value for consumers. It is the improvement in one's health or maintenance of one's health status that has value for an individual. Therefore, health care is demanded only when a positive impact on individual health status is expected from its consumption (Barr, 2001).

On a perfect, ideal market, which we analyze in this chapter, consumers are fully aware of the costs of health care and at the same time they are aware of the impact of its consumption on their proper health status. They have also perfect information about all possible ways of treatment and the quality of different care providers. Their demand for health care depends on several factors, among them being their current health status, the treatment available and of course the price of the health care, since they are individually constrained by their disposable income, as we do not assume any health care insurance in this section.

When individuals think about consumption of health care, they weight benefits of this consumption against its costs, as their primary goal is to maximize their individual utility. The benefits are improvements or maintenance of individual's health and we assume that a potential consumer knows exactly what these would be in case he consumes the health care. On the other side, the costs are represented by the price of care. But as the health care is not the only good available to a consumer at a given point of time, opportunity costs of not consuming another good do also enter into the cost-benefit equation. The opportunity costs mean that when an individual decides for health care, he or she cannot devote the very same financial means to get another good. With increasing price of health care the costs of it thus increase, whereas the benefits of it stay ceteris paribus the same. It is hence assumed that an individual demand for health care in the price-quantity space is a downward sloping curve.[5]

[5] To justify this assumption, more space will be devoted to individual preferences later on.

On an aggregate level, the situation is similar. Now, it is necessary to remind that health care is not a public good. One might speak about it in terms of public service (because of the presence of externality or because of some social values that will be elaborated further), but as such health care is still not a public good. In fact, it is a true private good, since it does not satisfy any of the two necessary conditions of economic theory for a good to be considered public: the non-rivalry and non-excludability conditions[6].

So, as the health care is a private good, to get an aggregate demand curve, we have to horizontally sum up all individual curves. This is the major difference from the case if health care was a public good. In that situation, to get the aggregate demand we would have to sum up individual curves vertically. However, vertical aggregation obviously does not make sense for health care, as the nature of it is not consistent with the non-rivalry characteristic (if one person consumes given health care, say undergoes a surgery, the same doctor, or even a different doctor cannot operate another person at the same time in the same surgery room and cannot use the same utensils), nor with the non-excludability condition (each of us can easily imagine many examples of how smooth would it be to exclude someone on purpose from health care consumption).

Hence, for the case of health care good, it is not true that when all members of a group demand some non-zero quantity of health care, the total quantity provided is the average demand per person and only the price the group is willing to devote to health care equals the sum of all individual values for this average amount of health care. The reality is the other way around. Individual quantities demanded by all concerned people sum up and the resulting unit market price is the same for each single person. In aggregate, total financial means devoted by a group to consumption of health care are equal to the total quantity consumed times the price.

Now, let's briefly turn to the supply side of the health care market. The supply is made up of providers of health care, i.e. primary care physicians, secondary care physician

[6] The non-rivalry characteristic of a good means that if a good is consumed by one person, it can be at the same time consumed by anyone else; the consumption of the first person has no impact on the quantity of the good available for consumption at the very same moment to the second, or third or forth person. On the other hand, the non-excludability characteristic is related to the fact that there does not exist any possible way how a society can exclude someone from consumption of a given good, i.e. how a person can be effectively forbidden from its consumption. (Stiglitz, 1997)

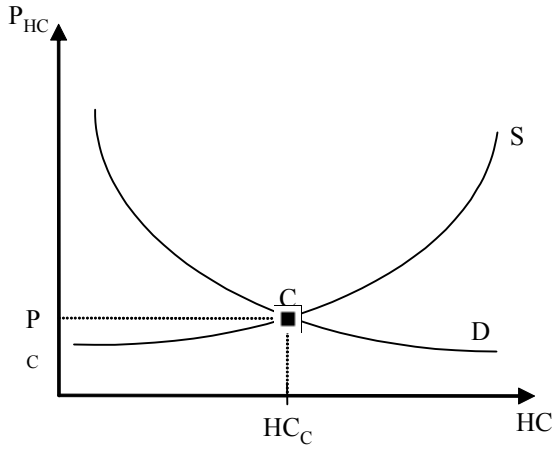
(specialists) and tertiary care providers (hospitals)[7]. Providers of health care supply a quantity of care based on their production costs, as their primary goal is to maximize their profit[8]. Production costs are any costs related to the process of a doctor getting in touch with a patient, curing the patient (including expenses for the use of medical technology, devices, and drugs), all the administrative costs related to this procedure and its financing, and, also, a financial premium for taking up the risk that the patient might not pay for the care after receiving it. From microeconomic analysis of supplier's behavior (see Varian, 1995), a supply curve, relating quantity of health care offered to a price level, of an individual provider who is exposed to competition is equal to his or her marginal costs curve (MC) above the average costs curve. Further, the aggregate supply curve is a horizontal sum of individual providers' supply curves. Without going further in details, let's assume for simplicity for the purposes of this and the second part of this thesis, which treat only the demand issues, that the aggregate health care supply curve is an upward sloping curve in the price-quantity space.

Putting the aggregate supply and demand curves we were just talking about together, we get the illustration of a perfectly competitive market for health care (without any insurance system), as is outlined on Picture 1.1. The point C represents market equilibrium. At the price P_C, the quantity HC_C of health care is provided and consumed. At this particular price, consumers get exactly that much of health care, for which they value its benefits more than its costs (including the opportunity costs) given the price. On the other hand, providers of health care supply exactly as much of the care, as is consistent with their goal of profit maximization. Price P_C is a market-clearing price. Nobody can get better without making anyone worse. The situation to which market arrives is pareto-optimal.

[7] Another way to divide health care providers is to distinguish out-patient (or ambulatory) and in-patient health care providers.

[8] The assumption of profit maximization is often questioned in health care economics literature. According to McGuire (2000) there is however not an alternative model than the neoclassical theory of the firm that would bring enough evidence to justify its use for a firm-physician (including the model of "target income"). Moreover, as McGuire (2000) shows, the assumptions of neoclassical theory of firm ("the firm sets price and quantity in order to maximize profit subject to the constraint of market demand") are to some degree satisfied in modern health care systems, so that it enables researchers to use providers' profit maximization as a sufficient (and currently the best) basis for a health care market analysis.

Picture 1.1: Perfect market for health care



Such an ideal market is however only a theoretical construction, as in all developed countries there does exist some kind of a health care insurance, which we have not at all assumed in this chapter. Health care insurance changes behavior of consumers and creates some welfare losses that we are going to analyze further in this work. It is going to be then there where this equilibrium outcome of a competitive market without existence of insurance will be used to measure the loss acquired by a society while having some health care insurance system.

1.2 Why publicly funded health care insurance

In previous chapter the subject of interest was a pure perfectly competitive health care market without any insurance system. In this chapter, we are going to extend stroke of our thoughts and incorporate also a health care insurance into our analysis. The mixture of market failures related to a health care sector, which were mentioned at the beginning of this part and are elaborated more in detail in this chapter, may lead to an explanation, why we can find so often a publicly funded health care insurance system in developed countries all over the world.

Let us first look at why a 'normal' insurance system (normal meaning in terms of a voluntary, privately based insurance) can never work with all types of health care events and

what are the 'social reasons' that are behind construction of European publicly funded health care insurance systems[9].

1.2.1 Failure of voluntary health care insurance market

Suppose that health care is provided on the basis that people-patients pay directly to a provider for the care received. There are at least three major reasons for which one might expect an insurance market to emerge in this area. First, most (but still not all!) of health care needs cannot be predicted by anyone and still less by a laic person. Second, health care costs are usually of a significant height and one would have to have sufficient savings to be able to effort a suddenly needed very costly care. Third, people are generally risk averse, and that's why they are willing to pay a certain extra premium in exchange for avoiding a risk of bearing themselves the potential enormous health care costs. Hence, a natural outcome of these circumstances would be an emergence of a general insurance system, where risk sharing between individuals would take place[10].

So, the question now is what is wrong with such an insurance system and why it cannot work. It is necessary to stress that the objective of any insurance system is to share unpredictable risks between individuals of a given group according to individual probabilities of frequency and costs of insured event. The problem with health care insurance is that to some particular individuals some of their health care needs are predictable (i.e. some health care costs are known with almost certainty to an individual, but may not be as obvious for a potential insurer). Thus, there exists an important information asymmetry between insurers and potential policyholders. If this asymmetry did not exist, everyone would take up the insurance for the same charge and be happy with the outcome. But as this is not the case, some individuals would start to feel that they are actually paying a higher insurance premium

[9] In all European countries, health care systems are built on publicly funded health care insurance. This is not however a case of all developed countries over the world. We don't need to go too far for one example of all: In the USA, there is not a general publicly funded health care insurance that would cover the whole US population.

[10] It is worth noting that what we are talking here about is the insurable risk, i.e. the risk of financial loss in the event of illness. The loss of health itself, i.e. deterioration of one's state of health, pain, and discomfort related to an illness is a non-insurable part of the risk of getting ill (see Donaldson and Gerard, 1995, or Frank, 2004). That's why we are always talking in this thesis about 'health care insurance' and not about 'health insurance', which could be misleading.

than is adequate according to their state of health and to the probability and expected costs of their health care need. So, the healthier individuals (i.e. with lower predictable health care costs) would start to withdraw from insurance system. This process would force an insurance company to increase insurance premiums for their remaining policyholders, because the average risk of the group would go up. As one can imagine, this process would continue in a circle as the 'healthier' ones (i.e. less costly people) of the group would again withdraw from the system, the premiums would have to be increased, and so on, until there are only a very high-cost policyholders who remain in the system, but who could not afford to pay prescribed insurance contributions. Hence, it is the asymmetry of information that would lead a voluntary health care insurance market to self-destruction.

It is important to stress that this issue of information asymmetry should not be confused with insurers' adverse selection. In case of health care, the information advantage lies at the side of policyholders. The problem is that a health care insurance market fails to transmit the necessary information for insurers to set general insurance contributions based on individual risks. Thus, there are individuals who decide to withdraw from insurance contracts because of too high contributions. [11]

A possible way out of this self-destructing circle of voluntary health care insurance is allowing the insurers for some adverse selection techniques. However, it is rational to suppose that such an insurance based on adverse selection will never cover all health care costs, since there would be no insurer to insure a 'known' health care expense, once he succeeds to get his policyholders to reveal all their future known costs. As a consequence, there would be smaller and smaller share of total health care expenses that insurers would be willing to insure, as the number of 'known' diagnosis and events insurers would refuse to insure will increase. According to European Commission (2004), such development would finally end up with a socially sub-optimal consumption of health care, because it may be difficult for persons with higher health risks to obtain affordable coverage.

[11] Please note, that asymmetry of information and resulting 'self-destructing' vicious circle of voluntary health care insurance don't constitute a market failure for the high-risk groups. On contrary, it is the market failure for the low-risk groups, as they are in general willing to enter into some kind of contract to insure against unexpected health care costs, but the market fails to transfer the right information between them and an insurer and so such a contract is not possible. (for more on this issue see for instance Donaldson and Gerard, 1993)

Yet, there is another market failure that also applies to health care: externalities[12]. Moreover, both positive and negative externalities are important. An example of a negative externality is a case of insufficient health care consumption related to treating a communicable disease – if a sick person doesn't get appropriate care, the danger of becoming ill for other members of a society increases significantly. On the other hand, an example of a positive externality is vaccination – by getting vaccinated, not only the risk of a disease diminishes for the vaccinated person, but there is also a decline in the risk for the rest of the given society, even if not all of them are vaccinated themselves, because the number of potential channels through which the infection can spread is smaller.

Externalities present an important market failure and can result in significant welfare losses if not taken care of by some kind of regulation. In case of health care, an individual may for instance choose not to consume a health care that has some positive externality, because he faces some financial constraint. Introducing a health care insurance that would be available to all members of a society for a reasonable price can thus decrease the subjective price viewed by an individual at the time of health care consumption and make him consume a health care with positive externality feature that he would otherwise not do.

European countries have all chosen health care systems based on publicly funded health care insurance to fight against the information asymmetry, adverse selection, and externality of health care market and associated insurance market. By making insurance systems compulsory for all citizens and defining the extent of insurance coverage (i.e. to cover also high-cost events with known individual probability), they solve the information asymmetry. Adverse selection is however not well solved unless some system of financial redistribution is put in effect (we will talk more about this issue in the third part of this thesis), nevertheless such a redistribution is also possible under the system of publicly funded health care insurance. And third, an obligatory insurance with general coverage can remove a financial burden and thus lower the price, among others, also of the health care types which have a positive externality feature.

[12] See Stiglitz (1997), p. 106, for definition of externality.

1.2.2 Social solidarity

Yet, when thinking about why European countries have chosen publicly funded insurance systems for financing of their health care sectors, other issues besides market failures mentioned above are also of the day. The idea of publicly funded health care insurance system is not only about solving market failures, i.e. about efficiency, but also about values that are extremely important for modern societies. These values can be in general called 'social solidarity". According to Donaldson and Gerard (1993), we can further distinguish between two major social concerns that express these values, and that is a concern about access to health care for all in need and a concern about equity of those in need in terms of the care provided. To get a better idea what is actually meant by social solidarity, three different levels of solidarity are being distinguished.[13]

The first level concerns solidarity between different risk (or cost) groups. This solidarity thus covers the "predictable", i.e. known, kinds of risks related to individual health status that would be under a normal insurance scheme covered by higher premiums assigned to respective individuals / groups[14]. In this case, modern societies usually think that it would not be fair if more vulnerable people to become sick had paid a higher premium to get the same type of insurance coverage (and hence the same type of health care when needed) as

[13] Different authors address the issue of social solidarity differently. The following classification represents my personal point of view based on what I have learnt from discussions with many Czech and other foreign internationally recognized outstanding experts in health economics. For the main part, the classification is based on Fidler (2004), to whom I also refer at the end of this section by Picture 1.2.

[14] *Note on expressions used in this paper*. As pointed out in footnote 7, the health care insurance is about insurance against "insurable" costs, i.e. financial losses associated with curing a sick person. The "insurable" costs can be further divided into two categories: the predictable (known) and the unpredictable costs (or risks, according to some authors). By predictable costs I mean either a situation when a person has a known diagnosis and so the future needed health care is known with significantly high probability, or a situation when some group of people is more likely to be more health care costly because of social status and associated living conditions, or because of living habits, or simply because of gender or age. Nevertheless, some authors use the terms "insurable" and "non-insurable" costs in place of what is here called "predictable" and "unpredictable", as for example Pažitný and Zajac (2004).

people from less risky group. This level of solidarity is thus connected with social concern of equity of all members of a society in its health care insurance system.[15]

The scheme, in which all members of a society participate on one risk pooling concerning all health risks, is beneficial for a society in the sense that it represents a way how a society can avoid a situation of morally (and legally) recognized cream skimming of the 'good risks' by insurers. Otherwise, without solidarity with predictable (i.e. known) health care costs and at the same time without socially approved cream skimming, the health care insurance system would face an information asymmetry market failure and consequent results, as described above.

Health care insurance systems in European countries respond to this level of solidarity in general by having a compulsory participation in the system, creating one pool of resources on a national level, and setting the price of insurance (i.e. individual insurance contributions) that is not related to individual health risk[16].

The second level of social solidarity is solidarity between richer members of a society and the poorer ones. This solidarity is closely related to the first one, but still needs to be distinguished. Based on social preferences, a society sets a formula according to which insurance premiums are being inflicted. Generally, there is some kind of progressive taxation-like-scheme, i.e. payments are related to income. By this kind of solidarity, a society usually addresses its access concern: insurance and the same coverage are available to anyone, no matter what is his or her social status. Again, societies usually respond to the second level solidarity by designing an obligatory health care insurance system, as with the first level solidarity, and by imposing insurance premiums based on an individual ability to pay.

The third level solidarity represents the solidarity between economically active and economically inactive population. Other definition could be also used to define this solidarity as between productive and non-productive parts of population. However, the former definition is more general and in my point of view it better captures the issue. It addresses both the access concern, as well as the "generation problem". By having automatically insured economically inactive population through means of contributions to the system by the

[15] There is also a link with access concern, as those more vulnerable to become ill are on average more often ill and hence in general don't have sufficient financial means to purchase the insurance. However, this is rather the issue of the second level solidarity addressed in the next paragraphs.

[16] See European Commission (2004) for description of EU Member States health care systems.

active ones, a redistribution between different age groups occurs on the basis of "pay-as-you-go" system and at the same time the access to insurance is preserved for all, even for those who are in "productive" age but don't have any taxable income (for example mothers on maternity leave, soldiers serving their compulsory service, etc.). The third level solidarity is in European countries in general addressed by guaranteeing an insurance coverage to all members of a society under a compulsory insurance system.

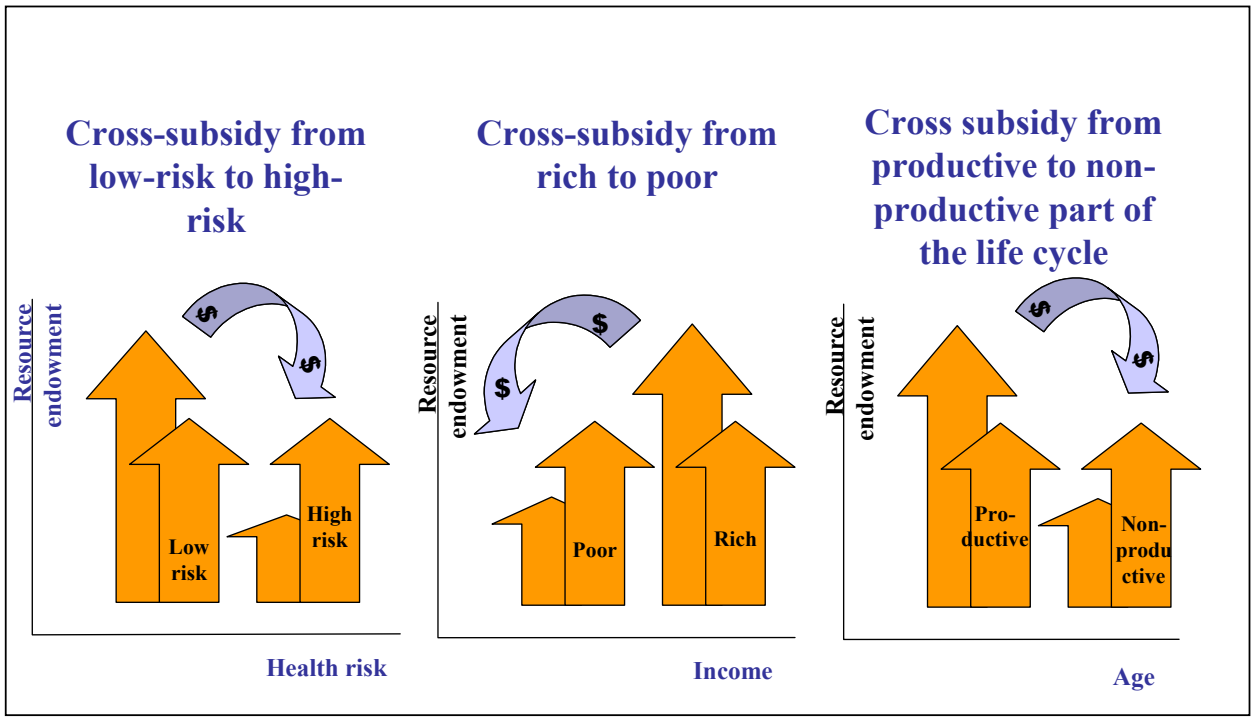
To sum up, different levels of social solidarity in the abovementioned classification are well addressed at once by compulsory health care insurance systems with payments related to individual ability to pay and with population-wide coverage, i.e. by publicly funded health care insurance systems of the European kind[17]. Furthermore, by such an insurance system a society address not only its concern about access to health care for all its members, but also its concern about equity of its members in terms of provided health care. For example, in Slovak Republic the equity in provided health care is defined as "equal treatment for equal need" (Pažitný and Zajac, 2004), which expresses that health care should not be provided on the basis of one's ability to pay for it, but on the basis of one's need, and that is exactly what the above-defined insurance system guarantees.

The following Picture 1.2 shows graphically how pooling of revenues can equalize inequalities at the level of individual (or group) financial means for health care insurance. It needs to be stressed that until now we have been talking only about resources and their pooling to share various health risks across a society. The conclusion that publicly funded health care insurance systems as defined in previous paragraph address the issue of social solidarity the best is strictly related to the primary stage of health care systems as a whole: organization of risk sharing. We have not talked in this chapter about anything concerning management of disposable financial resources, the provision of health care, or the role of a patient - consumer of health care. In following parts of this thesis we are going to concentrate

[17] There of course do exist health care systems, which do not count with a population-wide obligatory insurance, but get along only with voluntary health care insurance (as for example health care sector in the USA, where there are special state insurance programs for vulnerable groups, Medicaid and Medicare, and the rest of population is left to its individual decision whether they find it useful to insure voluntarily or not). However, such an insurance system does not address social solidarity in its full extent, since there are always groups of people "on the boarder" of the nation-wide insurance programs who don't qualify for neither of the programs, nor find it useful to insure themselves (sometimes they cannot financially afford health care insurance), and thus are not covered at all.

mainly on the demand side of health care market, though in the last part we will touch issues such as comparison between one-insurer system and plural system of competitive insurers while treating the overall health care sector efficiency.[18]

Picture 1.2: Pooling of revenues… equalizes inequalities



Source: Fidler, A. (2004)

1.3 Social welfare function

Even when health care is a private good, as was already argued, at the same time, as a commodity and service, it possesses some special features related to its social dimension. So, despite the fact that health is still a pure personal matter of each respective citizen, there is a "social matter" that should enter into our analysis, at least on the aggregate level when dealing with social welfare. As was said earlier, health care sectors of European countries are not regarded only in terms of efficiency, but some social values seem also very important to their societies. To further develop a framework in which we would be able to evaluate

[18] There is also another issue related to the collection of resources (i.e. a pre-stage of a health care system), as there can be an important efficiency difference (from the economic point of view) in collecting the respective financial means by different types of taxes. This issue is however not a subject of interest of this thesis, though further research in this area is definitely needed.

different regulating measures that can be introduced to ration health care demand in publicly funded health care systems (and potentially not only these), we need to define a social welfare function that would contain besides an individual welfare point of view also some other aspects.

First, social welfare function should account for presence of positive externalities and the range to which a society is able to make use of these, because value of health care for an individual can be in some situations smaller than value for a society. Second, it should consider the extent to which care is taken of the problems of asymmetric information and adverse selection of a voluntary health care insurance system. And third, in a social welfare function there should be incorporated an evaluation of the level of preserving in a health care system essential social values reflecting solidarity aspects of modern human societies (i.e. in general concerns about general access to health care and equity in provided health care, as elaborated earlier).

Social welfare theories provide several approaches to the definition of social welfare in health care (see Hurley, 2000) for overview of these). One of them, the utilitarianism, counts the sum of individuals' utility over the whole population. This is not in contrast with the neoclassical theory of consumer surplus, where social utility (or welfare) is presented as a sum of individual surpluses from a market contract, that is, as a sum of consumers surpluses and producers surpluses, which are acquired by individual agents in any bilateral trade on a market. Therefore, a sum of consumers and producers surpluses can be presented as one of the social welfare's dimensions.

The theory of consumers' surplus[19] states that a consumer surplus from market trade is equal to the difference between the value a consumer subjectively assigns to any one unit of a good he gains from the trade and the price he pays for each of these units. Further, producer surplus is defined as the difference between the price he gets for each unit of good he succeeds to sell and the production costs of these units. On a perfectly competitive market without any health care insurance, illustrated at

[19] See Varian (1995).

Picture 1.1, we can thus easily identify the consumers' surplus and the producers' surplus. It is clear that none of the involved parties is acquiring any loss from the trade on such a market for health care.

To put it other way around, on imperfect markets the issue is in general a consumer or producer loss due to some price differential between market-clearing price and the actual price[20]. An outcome of such a situation is social loss; a welfare loss called by the theory of consumer surplus dead weight loss. Because, as will be shown in next chapter, health care markets as we know them from European countries are thanks to their general insurance systems imperfect in terms of market-clearing price, we will use the dead weight loss as one of the variables of our social welfare function [SWF]. The variable of the dead weight loss (let's label it DWL) accounts for the welfare loss resulting from the inner organization of a health care system.[21]

The objective of a good health care system should be to minimize this variable as much as possible, since the smaller is the dead weight loss, the higher the social welfare. Hence, the first derivative of social welfare function with respect to dead weight loss (DWL) is negative. Concerning the second derivative with respect to the size of dead weight loss, I suppose that it is also negative. The arguments are as follows: The size of dead weight loss, in the binary space of price and quantity, is given by a triangle area stretching from the point of perfect market equilibrium and bounded by the demand and the supply curves[22]. The direction of its stretching from the competitive market equilibrium depends on the actual issue, nevertheless, the exact size of the dead weight loss is given by the location of current imperfect market equilibrium. Be the imperfect market equilibrium located at any of the four directions, the closer it is to the perfect market equilibrium, the smaller is the dead weight loss and the smaller is the loss's marginal change with its next approach.

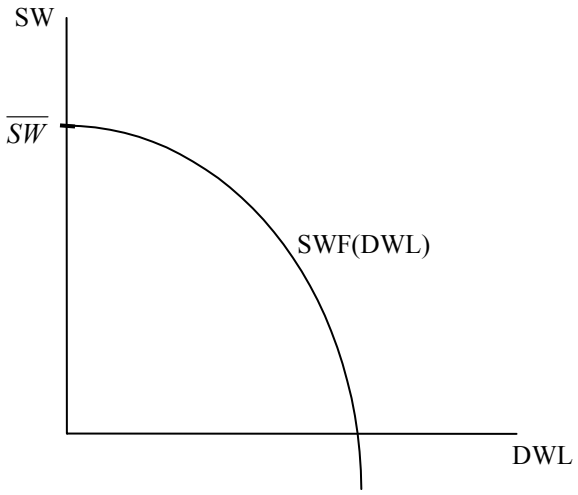
[20] The price differential can emerge due to various reasons: presence of price stickiness, price or output regulations, distortionary taxes, or because of other institutional arrangements of the market in question.

[21] The idea of measuring consumers' loss in a general example of publicly funded health care system against the situation achieved by standard market forces (i.e. consumers being individually fully involved in the process of paying for the care provided) is used by several authors. For example, we can find it in Donaldson and Gerard (1993), or Hurley (2000). Yet these authors do not develop any further model based on this concept. Instead, they limit themselves to the statement that there is an important welfare loss thanks to a universal insurance coverage. Some references to the theory of consumer surplus are also made in McGuire (2000).

[22] Graphical illustration of the dead weight loss will be provided in next part of the thesis.

Therefore, social welfare is decreasing and concave in DWL. For a zero dead weight loss, a society possesses a social welfare $\overline{SW}$ given by other variables of the social welfare function (SWF(DWL=0) = $\overline{SW}$). Picture 1.3 illustrates an outline of social welfare [SW] as a function of dead weight loss [DWL].

Picture 1.3: Social welfare as a function of dead weight loss – an outline of the dependency



The second variable of our social welfare function deals with positive externalities from health care provision (or negative externalities in case of underprovision)[23]. There are only a few issues in health care that really do represent an externality; however they are of a significant importance for a European society. For instance, these are the vaccination or curing of communicable diseases (for example tuberculosis). The question is how to evaluate the extent to which externalities are taken care of within a health care system.

For goods that produce positive externalities and for which exclusion is possible, as is the case of health care, the standard corrective policy is price subsidy (Hurley, 2000). Obviously, price of health care plays a crucial role in one's (individual) cost-benefit analysis. Thus, as we cannot increase individual's benefits from given health care (unless we will find a way how to make everyone altruistic to the intent that everyone would care how others are

[23] In this context, only externalities in the sense of a physical health, or 'safety', externality are considered. The "caring externality" will be a subject of interest of the next social welfare function variable.

actually doing), we can still decrease his individual costs at the point of use, so he will be willing to accept a treatment that he would not otherwise do[24].

By decreasing a given cost for an individual, a society is accounting for some positive externalities in its health care system by influencing its members' behavior. Obviously, the total cost of a given care is still the same, thus decreasing an individual cost means that the society will pay the difference itself. Here we come to a classical issue in public finance theory and that is how much should be the individual cost diminished and thus how much should the society pay for it, i.e. how much of this "publicly provided good" should be actually provided?[25]

Disregarding the public provision issue, a good measure at our disposal, concerning the system's externality-friendliness, is definitely the level of access of each member of a society to certain health care. Let's introduce this measure into our social welfare function as the second variable and label it ACCESS. Please note that so far we have been talking only about "given" or "certain" care. This is due to the fact that it is not the health care as a whole that possesses a socially positive externality, but rather only some types of the care. We have already mentioned two: vaccination and treatment of communicable diseases. Perhaps medical doctors would propose some other examples of types of care that also satisfy the criterion of a positive externality characteristic, but, nevertheless, externality in the sense of a 'physical health' or 'safety' externality is not a feature of health care in general (for instance

[24] In some cases in health care sector, however, additional action besides price subsidy may be justified. For example in case of some communicable infections (such as, for instance, sexually transmitted infections) a person may not realize that he or she is infected and thus the demand would be, from the society's perspective, too low even if the care was free. It is then there where we can observe that a society actually forces someone to consume a given health care. Nevertheless, such approach to health care is a very paternalistic one and can be classified as relying on merit goods concept rather than on pure 'safety' externalities. Merit goods, however, are not concerned in this thesis, as it represents a subject of the extra-welfarist approach to health care economics, which is not supported by the author.

[25] It is hard to ask each member of a society how much is he, personally, willing to pay for such social service, since with the externality, as well as with public good, there is this problem that each individual alone would answer that he does not want to pay (or does not want to pay too much), because he has no personal benefits of it (or only a small one that would not justify such a high contribution to pay the necessary difference for the measure to be effective). For more on public provision of goods see for instance Stiglitz (1997).

there is evidently no 'safety' externality in case someone undergoes gall bladder surgery, and suchlike).

This is a very important point, because it means that when a society wants to maximize its social welfare with respect to the level of access of its members to needed health care, a higher access increases the social welfare only under the condition that it concerns the kind of health care that possesses a positive 'safety' externality feature.

To sum up, social welfare is definitely not decreasing in ACCESS (= access related to health care with positive externality), at least to some certain point (if such exists) located very far from the origin, i.e. the first derivative of social welfare function with respect to ACCESS is bigger or equal to zero (further explanation follows below). The marginal social utility with increasing level of ACCESS is, however, surely converging to zero. I take the example of a communicable disease prevention to justify the statement that the second derivative, at least from a certain point, is negative: It is clear that a prevention, done for instance by means of vaccination, has a very significant positive effect on social utility if its utilization increases dramatically from a quite low portion of a population to a quite high portion (say, for example, from any percentage smaller that one half to any percentage higher that three quarters). However, this kind of prevention does not have to have necessarily a 100% population coverage to be effective. By getting most (but still not all) people vaccinated, the rest of the population is also protected, since the process of vaccination decreases the probability of spreading of an infection within population, and hence also those who haven't got a vaccine are now better off[26]. Therefore, as the vaccination coverage approaches one hundred percent of the population, its marginal utility effect vanishes rapidly, because there is smaller and smaller marginal decrease in probability of a potential disease event. At the extreme, there is no additional utility gain for a society to vaccinate the last person of a population, because if all others are already immune to a specific disease, he or she has no way from whom to get infected, and thus is also protected. At this point, the first derivative of social welfare function with respect to ACCESS (in this special case: access to communicable disease protection) is zero[27].

[26] Note that we are talking about vaccination that can be used as a mean of prevention against a communicable disease.

[27] The assumption is that there cannot be a negative social utility impact from increased ACCESS, i.e. the first derivative of social welfare function with respect to ACCESS is never negative (on its defined interval). What

Another possible variable of social welfare function that is also worth considering concerns social solidarity. We have been talking quite a lot about social solidarity, pooling of financial resources and risk sharing across various groups of people in previous section. Hurley (2000), p. 72, talks in this context about a 'caring externality'. In fact, he states, this externality derives from individual concern over others' health status. And since health care is an important determinant of health (especially when ill), ensuring access to health care services can be a policy response to 'caring externality'.

Therefore, to incorporate also the notion of 'caring externality' into our social welfare function (based on the conviction of a broad public support in most countries for subsidies to increase citizens' access to health care – see Hurley, 2000, p. 70), we make up an artificial variable SOL, which will show how large social solidarity is reached on all of the three levels specified in the preceding section. To be more specific, SOL attains the lowest value in the situation, where there is no solidarity between rich and poor, low-risk and high-risk groups, nor between productive and non-productive members of a society; and the highest value in the situation of unconditional general social solidarity represented by absolute financial and risk sharing between all mentioned groups.

Obviously, the first derivative of social welfare function with respect to SOL is bigger or equal than zero, as modern societies (and particularly those in Europe) in general express the importance of social solidarity with those "in need" and pretend to have an increasing utility function in these matters[28]. The second derivative is, however, not so clear. It is hard to say whether it is rather positive, zero or negative, as there is no clear observable fact from an everyday life and human behavior. Nevertheless, an assumption that social welfare function is concave in SOL seems rational[29]. Yet, the sign of the second derivative is

we are analyzing here is the social welfare affect, which does not take account of individual disutility steaming from the actual process of health care consumption (this effect is captured in the social welfare function under the dead weight loss variable). Even in the case when we are talking about access to health care in a more general manner than previously defined, the impact on social welfare is never negative (rather, it is zero in the fields where externality characteristic of health care defined under ACCESS is not present).

[28] Such a definition of SOL shows the importance of social altruism, i.e. altruism at the level of the whole society, usually expressed by its political representation; it does not necessary mean an altruistic utility function of each and all individuals.

[29] For instance, if we abstract away from health care sector into a more general case of social affairs, we can see that a society expresses the will to help the most those who are in the biggest need than those who are in "smaller

not as important for us at this moment. Rather, the crucial is the assumption that social welfare is not decreasing in SOL between its two extreme values. Bearing in mind that we are talking mainly about European societies with well-developed social feelings, we can accept this proposition without any hesitation.

To summarize the previous paragraphs, our social welfare function, which was constructed with the aim to evaluate health care systems, has so far three dimensions represented by three variables that are themselves functions of the internal organization of a health care system. Formally, we can write

$$\text{SWF:} \qquad SW=SW(DWL(x), ACCESS(x), SOL(x)),$$

where x represents the inner arrangements of a given health care system. Between their extreme values, social welfare function is decreasing in DWL and increasing in ACCESS and SOL.

This social welfare function captures all three major issues that we have identified at the beginning of this section: the level of individual welfare from the point of consumer surplus theory, the level to which health care externalities are accounted for, and the level to which essential social values in terms of social solidarity are taken care of.

According to the European Commission (2004), the economic rational for some public sector involvement in financing and provision of health care is for both efficiency and equity considerations. In particular, they identify four main problems of health care market (and associated insurance systems) as adverse selection, moral hazard, asymmetric information, and externality. All of these four issues are encompassed in our social welfare function defined above. The externality is covered by the ACCESS variable. Moral hazard (whereby the insured person may have an incentive to over consume health care, since he or she does not bear the full cost) and asymmetric information (whereby health care providers may be in a position to induce the demand for treatment) are issues of efficiency, which is included under the dead weight loss variable (and both of which will be treated more in detail

need". This fact is quite obvious when we look at the indicators that disturb European and other developed societies: First of all everyone is concerned with indicators of poverty, i.e. indicators showing how big fraction of a population lives in poverty (measured proportionally to the gross domestic product). These are people that we can consider to be 'in the biggest need'. Nevertheless, significantly less noise is then done about for example overall distribution of income over the population, though it may reveal that for example the second and third quintiles of population have income still significantly smaller than is the population's average…

in next part). And the adverse selection, which may, according to the European Commission (2004), p.4, "make it difficult for persons with higher health risks to obtain affordable coverage, and thus be leading to a sub-optimal consumption of health care services", is exactly the object of interest of the variable SOL, which takes account of all three levels of social solidarity defined in section 1.2.2.

Hence, the social welfare function defined in this section takes in considerations issues that the European Commission is also convinced should be addressed by European health care systems, though they don't express it explicitly in a welfare function.[30]

[30] Someone may argue that what we do not capture in the social welfare function SWF is the trade-off between European 'social feelings', expressed by the variable SOL, and economic performance, since according to empirical evidence there is a negative correlation between the size of government (i.e. the extent of public finances) and the economic growth. These worries about economic performance could be, of course, also integrated into the social welfare function for instance through the effect on individual behavior of different ways of collecting the necessary financial means. However, once we have chosen to deal mainly with publicly funded health care insurance systems, the question of the way of collecting the finances has no effect on social welfare derived from the inner organization of such health care system. Nevertheless, the issue is definitely worth further research.

Part 2 : Demand for Health Care

In this second part of the thesis, we turn explicitly to demand for health care. So far we have been assuming perfectly informed and fully knowledgeable consumers. However, in real life people in general don't have neither perfect information about possible medical treatments and drugs, nor are they fully conscious of their proper health status. Moreover, as we will see in this part, they do not take all costs of health care into considerations when deciding about their health care consumption if a system of publicly funded health care insurance is in place. A publicly funded system of insurance generally means that insurance contributions are not based on an individual's risk, as is the case of private insurance, but on an individual ability to pay. Such a setting, however, alters individuals' decision making to such an extent that we can in fact regard their demand for health care under some conditions as price inelastic.

In this part, we are going to treat all of these mentioned issues and also some more. We are going to see that there are exogenous as well as endogenous factors to the system that play an important role when dealing with social welfare drawn from health care consumption. Furthermore, we will also explore some possibility how health care system's welfare losses can be avoided or at least reduced.

2.1 Individual preferences and point of saturation

Individual demand for health care depends on several factors, among others for instance current individual health status, the treatment available and of course price of the health care at the point of use. This chapter is about individual preferences. The aim is to show that there does exist a situation, where an individual is saturated concerning his health care needs and where it would in fact cause him a disutility, if he were over-cured. The existence of such a point of saturation and its implication for modeling the demand for health care is a crucial characteristic in the next chapter's model of effective demand for health care.

For simplification, and without the loss of generality, we will distinguish two goods. The first one is a good "health care" [HC] and the second one is a basket of all other goods available for consumption at a given point of time [X]. Let's now concentrate on the health care good.

To remind, health care has only value as a mean to improve or maintain one's state of health. Without any doubts, there is no disagreement with the statement that health care is a normal good (with increasing individual disposable income, the demand for health care, affected by an individual budget constraint, that means under no insurance, increases too). Moreover, the health care has some tendency to be a luxury good (with increased income, the demand for good increases more than proportionally[31]). This fact is well evident on level of an individual in less advanced countries, where the health care consumption comes always after saturation of really basic human needs, or in advanced countries in case of, for instance, cosmetics surgery[32]. However, these statements correspond only to what we are aware of from our everyday life; they don't embrace all the theoretically possible situations. The author of this thesis supposes that the normality of the good "health care" has its limits, as well as the luxurity feature. In following paragraphs, this paper treats especially this issue.

While dealing with individual preferences, the crucial assumption of this paper is that there does exist such a point, where individual health care needs are saturated, i.e. an individual bliss point of desired health care consumption[33]. This suggestion comes mainly from the fact that despite modern and continuously progressing health care technology, science and its applicability still has its limits, and, moreover, there is still some personal disutility from the actual process of consuming health care: pain. Therefore, people won't voluntarily undergo a surgery, if they really don't need it (or if they are not convinced that they need it[34]). Hence, we can divide personal utility from health care consumption into two parts:

$$u(HC) = u_1(HS(HC)) + u_2(HC). \qquad (2.1)$$

[31] For precise definitions of normal and luxury goods see Varian (1995).

[32] The thing is that in advanced countries majority of health care is covered by insurance and, furthermore, health care insurance is mandatory in all EU Member States and in most OECD countries, except the USA (European Commission, 20004). Therefore, if we want to analyze whether health care is or is not a luxury good for an individual consumer, we have to deal only with those kinds of health care, whose is not covered by insurance and hence is non-zero for a consumer. That's why we can't use any cross-country data in this case to show whether there is or is not a relationship between income and volume of health care expenditures.

[33] Since this point relies on individual preferences, it is a very subjective matter, and as such depends strongly on an individual's perception of the reality. Later, we will treat some factors that can have an influence on this point.

[34] This refers to a phenomenon called supplier-induced demand, which is discussed in section 2.3.4.

The first part, u_1, is the positive utility from improving or maintaining one's health status [HS] thanks to health care consumption [HC], and the second part, u_2, is the actual disutility from the process of consuming health care. Under the assumption that individual utility is positively dependent on own health status, the first derivative of u_1 with respect to quantity of health care consumed is bigger or equal to zero ($u_1' \geq 0$), i.e. u_1 is not decreasing in health care[35]. On the other hand, its second derivative with respect to quantity of health care is, at least from some certain point HC°, HC°≥ 0, negative or equal to zero, i.e. u_1 is concave at least for all quantity of HC bigger than HC° ($u_1'' \leq 0$ for $\forall HC > HC°$), because there is obviously a situation, where an extra care doesn't bring any extra highly significant improvement to one's health any more, and at the same time it is no more necessary to help to maintain one's current health status. Whether the first derivation is approaching zero in the infinity, or actually is zero in some finite point, is not important now; the precise answer to this question has no impact on the forthcoming analysis.

Concerning the second part of the above equation, we suppose that u_2 is smaller than zero (or equal to), as it represents the disutility: $u_2(HC) \leq 0$. There is no reason to suppose that with increasing amount of consumed health care the marginal disutility from the process of its consumption varies significantly, i.e. depends on total amount consumed. For our purposes it is enough to agree on the assumption that the absolute size of marginal disutility is not decreasing.

Hence, based on the abovementioned argumentation, we can write that there exists a quantity $HC_i' > \overline{HC}_i$ for all i={1,…,n}, where $u_i(HC_i') < u_i(\overline{HC}_i)$. More generally, assuming that there does exist a bliss point in health care consumption, we can write:

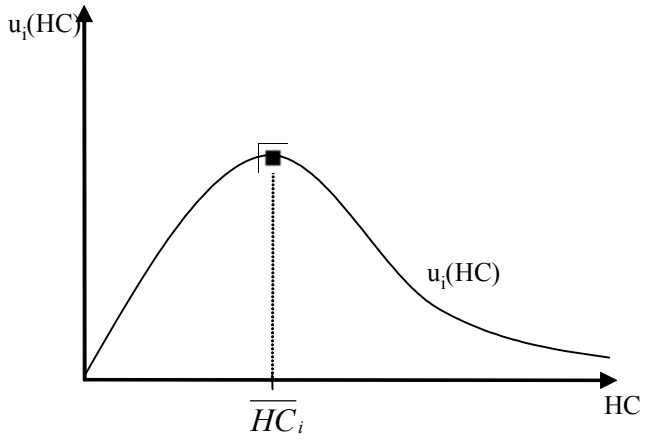
$$\exists \overline{HC}_i \in (0;\infty); \forall HC_i > \overline{HC}_i : u_i(HC_i) < u_i(\overline{HC}_i), i = \{1,...,n\}.$$

Therefore, we can display the total individual utility u(HC), a sum of the utility from improving and maintaining one's health status and the disutility from the process of health care consumption, as a dependant on total amount of health care consumed, as shown on Picture 2.1.[36]

[35] Note that we are talking only about 'constructive' health care, i.e. we do not consider any cases of a 'destructive' care that may actually lead to deterioration of one's health status.

[36] This line of argumentation about personal utility from health care consumption accords with that of Hurley (2000), p. 68. In his derived demand for health care, he separates the direct effect on welfare of consuming

Picture 2.1: Individual utility from health care consumption



$\overline{HC_i}$ is an individual's bliss point concerning his health care consumption, given his preferences and information and knowledge he has[37]. The individual acquires the highest personal utility possible when he consumes exactly the amount of health care equal to $\overline{HC_i}$. If an individual consumes more of the health care than $\overline{HC_i}$, his personal utility will be lower than the maximum possible utility available to him. Despite the fact that each individual can have a different level of $\overline{HC_i}$, as health care is a rival good (see chapter 1.1), we can sum the individual amounts of $\overline{HC_i}$ for all $i=\{1,\ldots n\}$ to get an aggregate, social health care bliss point $\overline{HC}$[38].

Now, let's get back to those other goods, commodities and services other than health care, that are available for individual consumption at a certain point of time, and whose basket we have labeled X. In general, we can consider this basket of goods as only one normal good,

health care, which he states is negative, and the implicit effect on welfare through contribution of health care to health status, which is positive under the condition of technical efficiency (which he defines as efficiency in production of health care services). Obviously, technical efficiency has its limits, given by current scientific knowledge. Hurley's derived demand thus implicitly supports this thesis's idea of individual utility from health care as displayed at Picture 2.1.

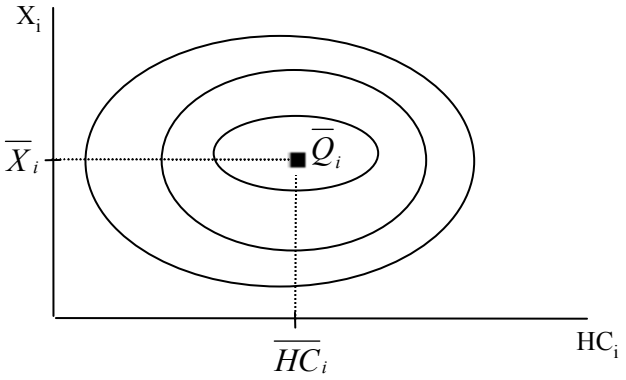
[37] Note, that we do not assume in this part anymore that people are perfectly informed and fully knowledgeable, as we had supposed in Part I. From now on we will work with loosened assumptions of imperfect information of people about their proper health status, medical treatments available, etc.

[38] Note that we are not talking about how much of health care is actually consumed, but how much health care all members of a group *would like* to consume.

because in this analysis we do not really worry about the amounts of each single possible good that a consumer might choose.

Concerning the basket of goods X, it is logic to suppose that there does exist a state of art where an individual is fully saturated with all commodities and services, though it is rational to assume that such a bliss point is located very far from the origin. Assuming an individual utility function U=U(X, HC), we can schematically draw an individual's indifference curves as on the Picture 2.2. Obviously, this is only an illustrative scheme; it does not capture the exact slopes of curves in different points, nor their distance from origin.

Picture 2.2: Illustration of individual indifference curves



Source: Varian (1995), p. 44

Therefore, theoretically there do exist situations in which an individual would be happier with actually less of the goods consumed. Though these situations are not too probable in real life, as they certainly require quite huge quantities of goods and services, it is important to be conscious of the fact that they are possible. This concerns both the health care and the basket of other goods. For the following modeling of demand for health care we will thus use only the part of individual preferences where indifference curves are downward sloping, i.e. the square part between the origin and the point of saturation $\overline{Q_i}$.

2.2 Health care demand curve

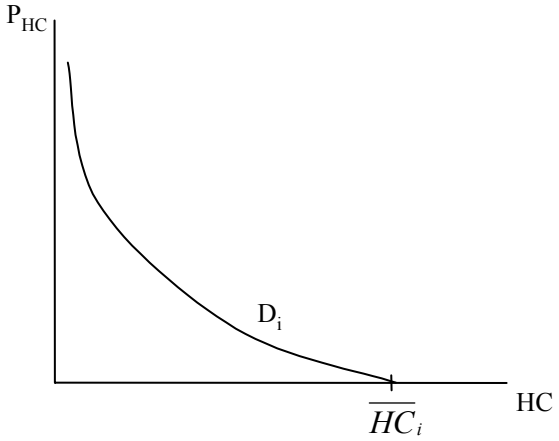
The process of deriving a demand curve from individual preferences with the help of price consumption curves is described in Varian, H.R. (1995), p. 107. However, the existence of an individual health care consumption bliss point, given individual preferences and available information, makes an individual demand curve to actually intersect the quantity

axis in point $\overline{HC}_i$. This is due to the fact that for a zero price of health care, corresponding budget constraint line is horizontal at the above Picture 2.2 (not shown), and thus there is such a point of tangency between this constraint line and the highest feasible-to-reach indifference curve, that it corresponds exactly to the quantity of health care $\overline{HC}_i$, which an individual *i* demands. For a given income and given price of other goods X, an individual demand curve (in a situation of no insurance) has a shape as illustrated at Picture 2.3.

Using the private feature of health care, we can horizontally sum up all individual curves in question, as well as all respective individual health care bliss points, to obtain the aggregate demand for health care[39]. This aggregate demand has the same characteristics as the individual ones, i.e. it is a downward sloping curve assigning a quantity $\overline{HC}$ to zero price.

We do not need to discuss here the exact shape of the demand curve towards the price axis, as this is not important in the model of following pages. However, it is rational to suppose that the demand curve converges to infinitely high price in zero quantity, because each individual's demand for medical care is potentially boundless.

Picture 2.3: Individual demand for health care



2.3 The model: Effective demand for health care

So far we have been talking about an individual demand for health care in the situation where there is no health care insurance available. In all cases an individual is applying a simple cost-benefit analysis to define his potential utility gain from health care

[39] Note that the aim of aggregate demand, which is presented here, is not to be a 'social' demand derived out of aggregation of individual preferences, but to be only an addition of individual demands.

consumption before he actually decides whether or not he wants (i.e. he finds it worthwhile for him) to consume such a care. In this particular decision making process under no insurance, an individual is taking account of all costs, that is of the financial costs of given health care and related services as well as of the opportunity costs. The shape of the demand curve we have obtained in previous section illustrates the non-zero price elasticity of the demand and the crucial dependency on individual state of health. Before treating more precisely some factors that may influence an individual subjective point of saturation concerning the amount of health care needed, let's talk about the situation of publicly funded health care insurance system, which creates an important impact on individual (and thus also on aggregate) demand.

Referring to the social welfare function of chapter 1.3, the highest values of SOL and ACCESS can be definitely assigned to publicly funded insurance systems that guarantee full coverage of and free and unlimited access to health care for all members of a society. The following model takes as its basis such an insurance system. It starts by treating an insurance that provides a first-dollar coverage; in later sections it is then extended to full coverage insurance systems allowing for co-payments, and in the final part of this thesis it covers also systems with coverage of only defined health care and/or limited access to it.

2.3.1 Effective demand

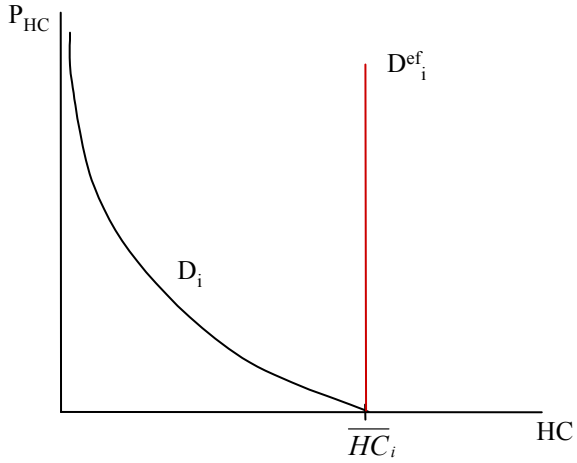
Designing a publicly funded health care insurance system with first-dollar coverage brings about one important issue that significantly influences the shape of a health care demand curve when compared to the without-the-insurance situation. The point is that by imposing a system, in which contributions are income related and insurance coverage is universal, the link between the price and the quantity of received services vanishes in the eyes of normal people – consumers. No matter how much of the health care they are consuming, whether just a little or whether the quantity of their individual consumption is enormous, they pay always the same amount of insurance contribution, which is based on their income (or net wealth).

Under these circumstances, what happens with individual demand for health care from previous section? The demand becomes price inelastic. People are no more conscious about how much does *their* health care cost, nor are they optimizing based on their individual budget constraint. They demand a quantity of health care that they are convinced, given the

knowledge and information they have, that they need it and that is useful for them in terms of their private utility, as given by the utility equation in chapter 2.1 when not taking account of the actual health care price[40].

Therefore, each individual demands volume of health care equal to his personal point of saturation of health care needs, i.e. to his $\overline{HC}_i$, no matter what is the real market price of health care and how big is his disposable income. If we still draw this new demand into the price-quantity space as we have drawn the previous case, the demand for health care becomes vertical, not dependent on price. Let's call this new vertical curve 'effective demand for health care' [D^{ef}]. The following Picture 2.4 illustrates position of the effective demand curve towards the former, 'without-the-insurance', demand curve [D].

Picture 2.4: Effective demand for health care



An individual effective demand for health care intersects the quantity axis exactly in the point $\overline{HC}_i$, as this point represents an individual subjective point of health care needs saturation[41].

[40] Some may argue that though people are not optimizing given their individual budget constraint (which is exactly the aim of a publicly funded insurance system to remove such constraints given by disparities in individual disposable incomes), they may be optimizing given the social, i.e. collective, budget constraint. This reflection is however incorrect. First, there is a huge free rider problem (see below), second, the issue of moral hazard is much significant (see section 2.3.3), and third, abstracting away from the free rider and moral hazard problems, no individual is capable to actually embrace the whole aggregate budget constraint and to deduce his 'personally adjusted' constraint in a system of publicly funded health care insurance that can be found anywhere in Europe.

Now, someone may argue that there is no point in drawing the effective demand curve in the price-quantity space anymore, once the individual demand is separated from the real market price and does not depend on it at all. Yet, this is the crucial point. Essentially, even though for an individual there is no connection between his demanded (and consumed) quantity and the price that has to be paid for this quantity, *the price still has to be paid*. It does not matter that it is a third party who pays for it (in the case of publicly funded insurance it is some insurance fund), because the money always comes originally from the individuals. Thus, the connection is not visible, but implicitly it is there.

In preceding sections we have been arguing that individual demand curves can be summed up to obtain an aggregate demand curve and that this aggregate demand curve intersects the quantity axis at point $\overline{HC}$, which is a sum of individual points $\overline{HC}_i$ over all *i*. Now, with the effective demand curve the situation is similar. An individual effective demand curve represents a subjective point of view of an individual who has no significant impact on his own insurance contributions via his potentially rationalized health care consumption (due to so many other consumers who on the general level outweigh his particular behavior). At the social level, for an individual there exist nothing like a 'collective awareness' concerning the relationship between quantity consumed and its price and its implication for the size of financial means that thus need to be collected from consumers. Also, the problem of free riding arises, since for each individual of a society that devotes only limited means to health care it is rational to expect that even though he himself would somehow reduce his personal health care utilization, there will be always someone else who would fully exhaust the suddenly free means. Hence, even at the aggregate level we can demonstrate an aggregate (collective, but still individually subjective) effective demand curve, which has exactly the same shape and the same position towards the original, without-the-insurance, aggregate demand curve as an individual curve at Picture 2.4.

It is important to stress that the aggregate demand we are talking about is a pure sum of individual demands, i.e. a sum of individual preferences. It is not a 'social' health care

[41] An individual point of saturation depends on several factors: the level of available treatment (i.e. the state of feasible technology and its accessibility), individual state of health (which in turn depends on age, gender, and social status among others), etc. But most of all, it depends on individual's perception of factors, which is a function of individual's knowledge and quality of information that are at his disposal. These issues are to be discussed further below.

demand, i.e. demand of a society's political representation on behalf of all citizens, though at the end these may be the ones who in a publicly funded health care system finally decide how much of health care will be actually provided (and thus also consumed). Still, even in such situation, the concept of aggregate demand as we develop it here is a useful benchmark against which changes in welfare due to changes in a 'social' demand can be measured (changes in a 'social' demand may in general correspond to regulating limits on price or quantity that are dealt with in the third part of this thesis).

2.3.2 Dead weight loss: publicly funded insurance creates inefficiency

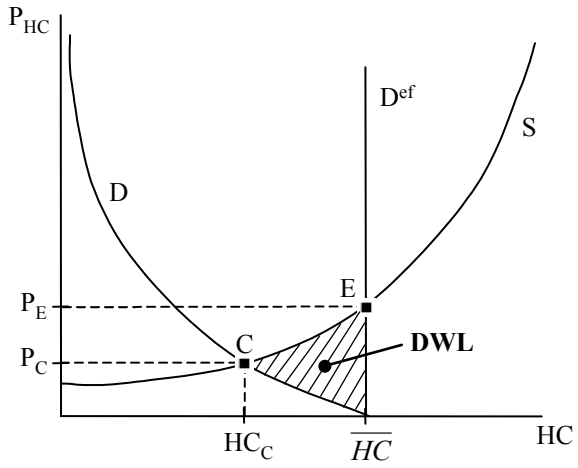
The existence of the effective health care demand, which is price inelastic, under the system of publicly funded health care insurance has several implications that are definitely worth our attention. The effective demand creates market imperfection resulting in social welfare loss represented by a dead weight loss.

Let's assume for this moment that the health care supply curve has a shape as illustrated on Picture 1.1 of a general competitive market (the supply curve is upward-sloping in the price-quantity space). We are not going to further analyze here what actually leads suppliers to behave in such a manner, nor what are the variables that influence their behavior and thus also the position of the supply curve, nor what is the role of insurance funds as system intermediaries[42]. Neither is important whether the supply curve intersects the price axis in origin or in some point bigger than zero. The crucial assumption of this section is, however, that suppliers (i.e. providers of health care) are price-takers and therefore cannot influence the resulting market price by their own market power. This assumption refers to individual behavior of each supplier, meaning that none of them can acquire any excessive profit owing to his monopolistic behavior. Such a behavior is not permitted under this assumption.

[42] The extent of this paper doesn't allow us to concentrate in depth on the behavior and related social welfare implications of all health care market agents. Hence, the emphasis is given on the demand side of the market to develop a model of effective demand that can definitely be extended and used also when analyzing the providers' side and the role of intermediaries. Some analysis of these issues is provided in part 3 of this paper, though further research on this issue is definitely needed.

Now, let us introduce the aggregate supply curve into Picture 2.4 when associated with aggregate demand for health care and aggregate effective demand. The situation is illustrated on Picture 2.5.

Picture 2.5: Publicly funded insurance and associated dead weight loss [DWL] on the market for health care



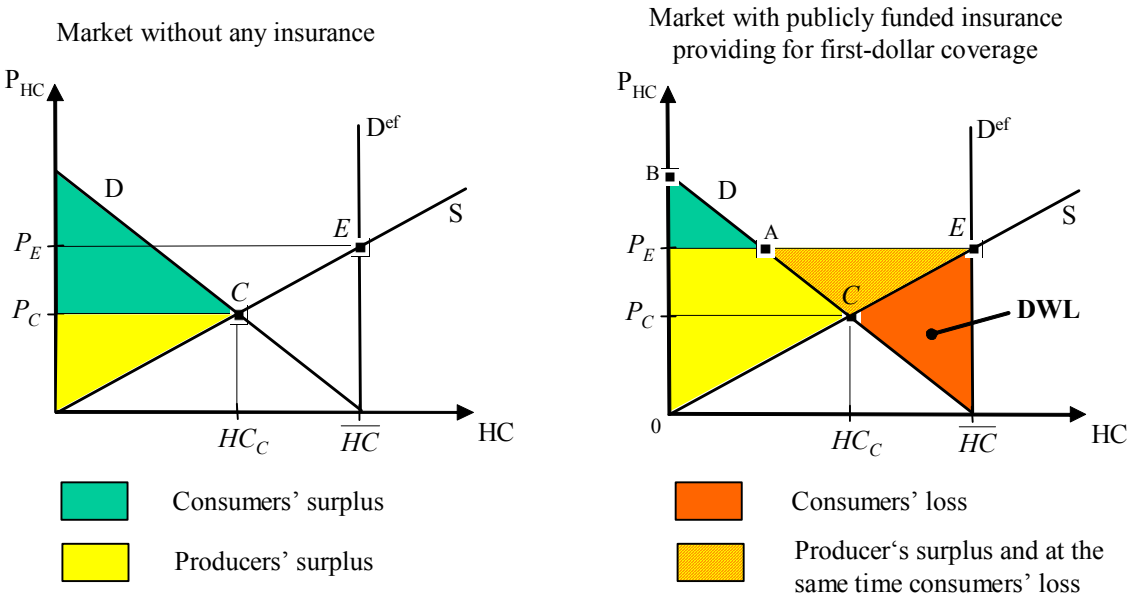
The point C represents the competitive, without-the-insurance market equilibrium, whereas the point E represents the publicly funded insurance (with first-dollar coverage) market equilibrium. The market price P_C relates to the situation when an individual consumer takes account of the real price of his health care utilization and is constrained by his disposable income, while price P_E is the market price when individual consumers optimize their health care consumption *without* the relevance of its actual price. The aggregate effective demand curve is vertical, price inelastic, and intersects the quantity axis in point $\overline{HC}$, which is the sum of $\overline{HC}_i$ over all i, i=1,…,n.

On a competitive and without-the-insurance market, the total consumers' surplus is given by the area between the demand curve D above the equilibrium point C, the price axis above the price P_C, and a connecting line between points C and P_C. On the same market, the total producers' surplus is represented by the area bounded by points P_C, C and the intersection of supply curve S with the price axis. A sum of these two surpluses constitutes a social welfare attained from all bilateral trades that occur on this market. There is no loss acquired by either party from such market contract.

To make the case clearer for a reader, before we approach to analyzing consumer and producer surpluses and their potential losses from trade on health care market with

publicly funded insurance, let us draw a simplified diagram of the market, where demand and supply curves are for transparency reasons linear. Very schematically, the following Picture 2.6 illustrates the two market cases and associated welfare gains and losses.

Picture 2.6: Health care market welfare diagram



Compared to the situation of market without any insurance, on market with publicly funded health care insurance system, the total consumers' surplus is again the area between the price axis and the demand curve D, but only above the price level P_E (which is higher than the price level of previous case, and thus consumer surplus's area ABP_E is smaller than CBP_C. Furthermore, according to the theory of consumer surplus, there is also a consumers' loss given by the curves and lines in a triangle between points $\overline{HC}$, E, and A (the intersection of the demand curve D with the level of price P_E). Concerning the suppliers' surplus, in this market organization it is bigger than in previous case, as it comprises the whole triangle area between the origin (in general the intersection of the supply curve S with the price axis), the price P_E, and the point E.

Adding the two surpluses and one area of loss together, we get a quite surprising result: Total surplus obtained in the first market case is again acquired; it is exactly of the same size. Next to that, a triangle between points C, E, and A (the intersection of the demand curve D with the price level P_C) enters into our welfare equation twice, once as a gain (for suppliers) and once as a loss (for consumers). Thus, concerning the total social welfare, the

two amounts with opposite signs cancel each other. However, in contrast to the case without the effective demand curve, the market now reveals one more loss, which is not counterbalanced by any surplus. It is the area between point C, E, and $\overline{HC}$.

Hence, the social welfare, in terms of total acquired surplus and loss, is smaller in case of publicly funded health care insurance system compared to the situation of without-the-insurance health care market. The difference between the outcomes of the two systems is the dead weight loss [DWL], which is marked by the shaded area between points C, E, and $\overline{HC}$ at Picture 2.5, or by the red area at Picture 2.6. The crucial point of the effective demand model is that this very welfare loss is not due to any imperfect market structures[43], but it is a natural outcome of publicly funded health care insurance with first-dollar coverage on market for health care utilization. The simple reason is that price of health care is optically zero for an individual consumer who is about to decide about his personal health care consumption.

Note, that the actual market price resulting from this setting is given by the effective demand (which depends in this case exclusively on the position of the sum of individual points of health care needs saturation) and by the supply curve. Since the effective demand is price inelastic, it is obvious that it is the supply curve that is decisive concerning the final market price P_E. Omitting all possible scenarios that may come about as a consequence of different market structures of providers of health care, even in this static situation the market arrives to a price that is diametrically different from the equilibrium price reached by the competitive, without-the-insurance health care market. The price level P_E differs significantly from the original market-clearing price P_C and therefore implies the existence of a dead weight loss, which has been shown at above pictures. Hence, a publicly funded health care insurance system creates inefficiency via its impact on market agents' behavior.

There is also one more striking welfare result of this market setting and that is the distribution of market surpluses and welfare losses between the demand side and the supply side of market actors. Suppose that a society has enough of financial means to provide for the whole amount of health care $\overline{HC}$ at the price P_E. Comparing to the case of a market without

[43] Though we are not saying that there cannot be any market structure imperfection (as for example monopoly, oligopoly, monopolistic competition, chain monopoly, and so on), but for simplification we have eliminated them from the analysis by assumption. Thus, the DWL, with which we are dealing here now, is not affected by any such potential market structure; it is solely the outcome of introducing a publicly funded insurance with first-dollar coverage.

insurance, there is a significantly bigger suppliers' surplus on the market with insurance. Hence, by introducing a publicly funded health care insurance, suppliers are definitely better off. But what about the consumers? From Picture 2.6 it is well obvious that there are them, i.e. their market side, who acquire the whole social welfare dead weight loss resulting from a market setting with insurance. Furthermore, they also earn the loss represented by the triangle above the point C (area between points A, C, and E). In aggregate, this area of loss cancels due to suppliers' surplus of the same size in the equation of social welfare. Nevertheless, to be precise, the consumers are those who suffer this loss. Thus, even though it is not evident from the aggregate social welfare, consumers are loosing twice and their total loss is in fact importantly bigger than signaled by the social welfare measured by the dead weight loss.

It is important to point out, that the just described situation refers to health care markets with publicly funded universal insurance coverage and free and unlimited access to any health care[44]. In this situation, each individual consumer is in fact personally satisfied; he gets exactly what he wants no matter whether he could or could not otherwise afford to pay for it. This satisfaction however vanishes when it comes to paying for medical bills, even though the payments are effected from one shared financial pool, i.e. by a third-party payer. Hence, despite the fact that we are dealing primarily with individual demand and effective demand, we are in fact modeling two markets at one picture. Thus, the social loss is not acquired at the level of health care consumption, but rather at the level of payment, i.e. when we, as a group, realize the overall costs. Thus, we are referring to the dead weight loss as to social welfare loss, although it is only a sum of individual welfare losses related to actual price and original demand curve.

It is also important to be aware of the fact that the model of effective demand is limited only to health care insurance systems where individual contribution is based on an individual's ability to pay and not on his personal health risks. If an insurance system is based on some other than public type of funding, the amount of health care consumed may be reflected in consumer's later insurance contribution. But it is not only the price of health care at the point of use, which stands behind the model of effective demand, but also the overall

[44] In latter chapters we are going to talk more in detail about imposing some price and/or quantity restrictions on providers of health care, which of course modifies the conclusion about welfare loss distribution between consumers and suppliers outlined in this section.

lack of a link between price and quantity of health care for a consumer in (at least) medium term. Other than publicly funded insurance systems are however able provide such link.

Let us now recall the social welfare function of chapter 1.3. Besides the dead weight loss (DWL), there are two other variables that as well enter this function. The first one is called ACCESS and is defined as the level to which the access to special health care (which holds some positive externality features) is secured for all members of a society. The second one is called SOL (as 'solidarity') and is related to the level to which arrangements of a system capture essential aspects of social solidarity described in section 1.2.2.

In the situation of publicly funded insurance system, where contributions are based on individual ability to pay, and which provides full (and first-dollar) coverage and unlimited access to any health care, the variables ACCESS and SOL reach by definition the highest possible values (recall that ACCESS refers only to a subset of health care, in which it is increasing). Therefore, the dead weight loss illustrated at Picture 2.5 is partly outweighed by the positive effect the publicly funded health care insurance has on the other two variables of the social welfare function of chapter 1.3. To what extent one effect balances the other or whether the positive 'equity' effect even fully outweighs the negative efficiency aspect, we are not able to say based on our so far analysis. Still, it is neither the goal of this paper. Instead, the aim is rather to analyze impacts of different exogenous and endogenous effects on health care market setting and social welfare under publicly funded insurance system.

To sum up this section, we have so far developed a model of effective demand that has helped us to understand, based on the theory of consumer surplus, the extent of efficiency loss, in terms of dead weight loss, that is being sacrificed by societies in order to obtain higher level of social solidarity and equity among their proper members (also referred to as 'caring externality'). We have also studied the distribution of these welfare losses and we have realized that, under the condition that a society has sufficient means to pay for all required health care expenses, there are in all cases consumers, i.e. clients of publicly funded insurance system, who suffer the whole dead weight loss and on the top of it also the loss produced at their expense by the supply side agents of the system.[45]

[45] Some may argue that, however, we do not observe any excessive satisfaction of health care providers (i.e. doctors) with health care systems in European countries; a conclusion that can be also drawn out of this section. An explication of this fact of reality will be given in part 3 of this thesis.

Before we move to the next section, it may be useful to look at how other economists address the (in)efficiency issue of health care sector. In Donaldson and Gerard (1993), and also in Hurley (2000), we can find references to consumer surplus theory that is also used in this thesis. Both authors use as a benchmark the equilibrium of a competitive health care market without any insurance. They also describe the allocative efficiency loss as arising from the 'excess' utilization generated by insurance, which creates an excess burden (Hurley, 2000, p. 84). However, none of them introduces any notion similar to that of the effective demand concept (which is an invention of this thesis's author). Moreover, their argumentation is based on the assumption that the difference between Q_1 (quantity consumed in absence of insurance) and Q_0 (quantity consumed under first-dollar coverage; corresponds to the quantity of what we call here $\overline{HC}$) is a result of moral hazard that introduces an insurance system. The author of this thesis however thinks that this is not an accurate explanation, because the 'excess burden' that faces the insurance system is a result simply of rationalized behavior of individuals when the price is smaller at the point of use than it would be under no insurance. The difference in consumptions is thus an outcome of people's optimizing behavior, given their preferences, prices of other goods and their budget constraint, and has nothing to do with moral hazard. Instead, moral hazard is a phenomenon that comes *after* a person gets insured and then changes individual's perception of his proper health care need bliss point. Thus it increases individual's $\overline{HC}_i$ compared to his $\overline{HC}_i$ before introduction of a first-dollar coverage. The issue of moral hazard is going to be treated separately in detail in next chapter of this thesis.

2.3.3 Moral hazard

In publicly funded health care insurance system the link between price and quantity is lost in individual consumption decision-making process. No matter how much of the health care a person is consuming, in a solidary system he or she pays always the same size of insurance contribution, which is based on his or her income or net wealth, or simply on his or her ability to pay. The result of this disposition is the effective demand for health care, which is price inelastic and which has been described above.

Still, there is one other market imperfection that we have not yet talked about much, but which enters the system with insurance introduction. It further affects the outcome of

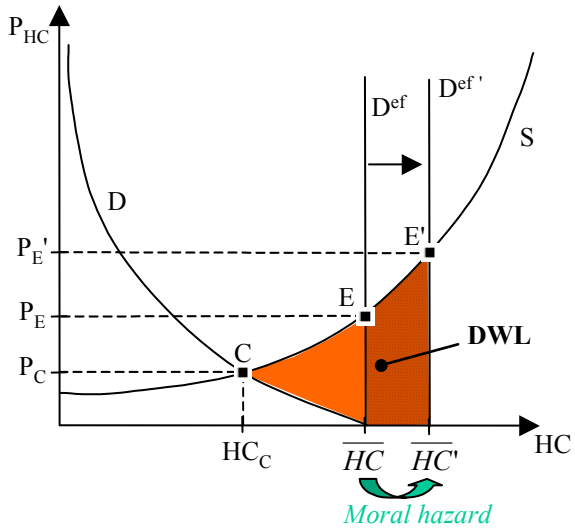
health care market arrangements in a negative way. This imperfection is however a general characteristic of any insurance system and is called moral hazard.

Moral hazard is an endogenous effect emerging on health care markets from introduction of insurance. Generally, we can speak about moral hazard related to consumers, as well as about moral hazard relating to providers of health care (Donaldson and Gerard, 1993). In this section, we will thus treat only moral hazard assigned to consumers. According to Zweifel and Manning (2000), we can distinguish two types of consumers' moral hazard: ex ante and ex post moral hazard[46]. Both of them, however, are inseparable phenomenon of any insurance system. Let us now point to the fact, that moral hazard itself *is not* a market failure that could be associated with a health care market without an insurance (in contrast to for instance information asymmetry, which represents a market failure for low-risky groups of people and which a system of publicly funded health care insurance, as described earlier, aims to avoid). It is the insurance system that creates this imperfection.

If we look at Picture 2.5, we can illustrate how consumers' moral hazard modifies the market outcome and related market inefficiency under publicly funded health care insurance.

[46] A recent issue in health care economics is also a dynamic ex post moral hazard. It deals with issues such as people's rising expectations about health care in time, demographic changes, technological changes, and so on. Unfortunately, though the author of this thesis had supposed to involve these issues also in the content of this thesis, it showed that the extent of this thesis is very limited, and thus the exploration of these issues is beyond our today's subject of interest and rests for future research.

Picture 2.7: Publicly funded insurance and moral hazard



Note: For illustrative purposes the impact of moral hazard on effective demand is exaggerated.

Moral hazard affects an individual bliss point in terms of the amount of desired health care that an individual is convinced, based on the information and knowledge available to him, he needs to improve or to maintain his personal state of health. Ex ante moral hazard means that when an individual is insured and he is aware of the fact that financial costs levied on him for his treatment in case of an insurance event don't depend at all on his personal behavior, he has no incentives to invest in prevention and avoidance of more risky behavior to avert the occurrence of an insurance event. The extent to which an individual has no incentives to avoid more risky behavior increases with lower personal obligation to pay directly for the health care received. Thus, the smaller the price, which an individual pays in the system, depends on the amount of care he consumes, the higher his ex ante moral hazard, because the more risky is his behavior, and therefore the higher the probability of accident or other event that will require additional health care.

With ex post moral hazard, the situation is similar. Since there is no connection between individual's insurance contribution and his personal risk (to the intent that this includes not only his given health risks, but also the level of his risk aversion and consequently the level of his consideration for all personal welfare (not only financial) losses connected with his state of health amelioration or maintenance), a publicly funded health care

insurance creates higher ex post moral hazard. The reason is that this system lowers total costs in a personal cost-benefit analysis and therefore an individual tends to disrespect the recommended course of medical treatment more than he would otherwise do. Which in turn is more costly for the system as a whole.

So, moral hazard increases individual bliss points of individually desired health care $\overline{HC}_i$, and thus also their sum over all i $\overline{HC}$, through more risky behavior of people under universal coverage whose payments are not related to their individual health risks and behavior. The aggregate effective demand therefore moves further from the origin (to the right at the welfare diagram) and the dead weight loss on the market for health care is even bigger than previously illustrated at Picture 2.5 or Picture 2.6.[47]

2.3.4 Supplier-induced demand

In a third-party-payer market, as is any health care market with publicly funded insurance system, doctors play an ambivalent role: they both supply medical care and demand it on behalf of their patients. This creates an effect called "supplier-induced demand".

The reason why this phenomenon can ever occur is that people-patients have in general only incomplete information and knowledge about their proper health status and, moreover, about all medical treatments, medicines, and devices available. Simply, consumers of medical services lack the information to make informed choices. Yet, the issue of incomplete information and only limited knowledge concerns the demand for health care in general, not only the case of the effective demand. If consumers don't have appropriate information, the outcome of their personal cost-benefit analysis, upon which they base their decision about consumption of health care, is seriously biased. An individual demand for

[47] In the context of previous section, note that 'more risky behavior' is an outcome of insurance and it extends market inefficiency, but the mechanism is different than is described in Donaldson and Gerard (1993) or Hurley (2000). *Before* introducing an insurance, an individual has a health care bliss point $\overline{HC}_i^{\,0}$, which is smaller than his later health care bliss point $\overline{HC}_i^{\,1}$ under a first-dollar coverage, because $\overline{HC}_i^{\,0}$ represents a desired amount of health care based on individual behavior when *insurance is not in place*, whereas $\overline{HC}_i^{\,1}$ is evaluated only *after* insurance starts to apply and thus incorporates also the change in individual's behavior towards more risky one.

health care is thus influenced by the amount of individual's delegation of authority to his physician (see Donaldson and Gerard, 1993, or Zweifel and Manning, 2000).

The effect is, however, multiplied in the case of a publicly funded insurance system. Providers of health care, represented by physicians, face conflict of interests, since they have their private incentives to influence to some degree the demand for health care by their patients, and at the same time they should be impartial managers of their patients' behavior with the aim to rationalize their care consumption. The first position of physicians goes along with the goal of their personal utility maximization, which is done through personal income, i.e. providers' profit maximization. The second one is the outcome of patients' authority delegation and the guardian role of physicians that some health care systems assign to them. Though there are different payment mechanisms available at the hand of payers to avoid the undesirable financial incentives of providers, in general a physician can always benefit somehow from influencing the demand no matter what remuneration mechanism he faces[48].

The fact of the matter is that as people are willing to delegate the authority (due to their awareness of their limited knowledge), they become susceptive by their physician's opinion. And since under a publicly funded insurance system the price of health care does not enter into individual cost-benefit decision-making, a doctor can again more easily influence the level of an individual's subjective amount of health care need saturation $\overline{HC_i}$.

The phenomenon that we are facing here is the principal - agent issue. There is always an information asymmetry favoring the agent, at this case a doctor, at the expenses of the principal, here a patient. The issue is multiplied by the fact that a principal is only indirectly, through redistributed contributions, affected by the agent's behavior in terms of financial costs of his acting. Hence, imposing some guardian or gate-keeping role on a doctor by a health care system warps even more an already distorted state of a relationship between a medical provider and a health care consumer (it needs not to be necessary a patient; rather it concerns a "client" of the system, or consumer in general).[49]

[48] There is a slight exception of capitation payment mechanism, however this mechanism can be used only for first-stage health care providers and not even for all ambulatory specialists in general. Moreover, the capitation mechanism suffers as well from its proper weaknesses.

[49] For more on the agency issue in health care sector see for instance Zweifel and Manning (2000), or Donaldson and Gerard (1993), or Frank (2004).

The ease with which medical providers can pass on costs when consumers pay for medical care through a third party stands behind the obvious demand inducements in all publicly funded health care insurance systems. One example which serves for all is the British National Health Service, where already in 1951, three years after it came into being, the costs of health care were three times higher than originally predicted (Wallace, 2004, p. 5).

The result of individual demand inducement, or rather of the induced rise in individual $\overline{HC}_i$, is a shift of effective health care demand curve to the right in the price-quantity space, since the aggregate of subjective health care bliss points, $\overline{HC}$, also moves to the right. The significance of this move is a function of patients' authority delegation and the extent of physicians' private incentives to increase the demand[50].

Hence, the impact of demand inducement on the market for health care is similar to that of moral hazard on Picture 2.7, though the causes are different: The effective health care demand curve increases and, as a result, the welfare loss in the sense of the dead weight loss also expands. Furthermore, the social welfare in terms of the whole social welfare function of chapter 1.3 decreases proportionally with the increase in the size of the dead weight loss, because a demand inducement means no change in the ACCESS variable, nor in the social solidarity variable SOL.

2.4 Comparative static analysis

Effective demand and the associated dead weight loss on a publicly funded health care market depend in principal on the aggregate of all respective individual health care bliss points. The aim of this chapter is thus to analyze more precisely factors that influence individual subjective points of saturation related to personally required (i.e. desired) amount of health care. So far we have been concerned with two factors, rather endogenous of the health care insurance system. These were moral hazard of a policyholder and demand inducement resulting from a principal – agent setting of relationship between a doctor and his patient. Now, the space will be devoted to important exogenous factors and their influence on

[50] Besides information disadvantage of a patient, Zweifel and Manning (2000), p. 415, mention also two other factors that have an influence on consumer's incentives (i.e. his preferences) concerning the degree to which he or she delegates the decision-making authority to the physician. These are shifting of responsibility and insurance coverage.

the demand for health care, the effective demand, and also their implication for social welfare. The following subsections are going to further elaborate on the impact of social wellbeing improvement and of medical technology progress.

An important factor that affects individual health care bliss point $\overline{HC_i}$ is definitely individual state of health. We can indicate three main arguments that shape individual health status and based on which an individual risk can be roughly identified. These are age, gender, and social status of a person. However, speaking about a static analysis of the model of effective demand, these don't represent the crucial variables to which the above paragraph is referring. Unless there is an outbreak of an epidemic or other catastrophe (natural or human caused), the share of gender and age groups in a society won't change by itself. The issue is the same with different social groups, even though the matter is, however, a bit more complicated. Still, it is not the change in social status itself over a whole society, which influences the effective demand for health care, but rather there is another exogenous variable, which, among other, determines the size of aggregate health care bliss point and thus also the position of effective demand through its impact on living conditions of members of a society. The first coming subsection treats this issue more in detail.

2.4.1 Increase in social wellbeing

The effect of a society's increased wellbeing on demand for health care, and consequently on the effective demand, is actually twofold. First, it concerns the influence on individual and aggregate health care demand via the impact on increased individual disposable income. Second, the transmission goes through the effect of lowering individual health risks by increasing personal social status as a consequence of a general improvement in society's wellbeing.

Just to remind, note that disposable income plays an important role when deriving a price-elastic demand curve from individual preferences (see Varian, H.R., 1995, p. 107), a procedure that has been used in previous chapters. A sudden increase in an individual's disposable income means a change in his or her proper budget constraint: For a given price of health care and a given price of other goods X, the budget constraint line moves up to the right. For the part where the normality feature of health care good holds, this means that a person will now demand a bigger quantity of health care (because he or she can reach now

with higher income a higher indifference curve, which was formerly not feasible). However, there is one point for which the individual demand won't increase. This is the health care point of saturation. For this special point, no matter how big is the given disposable income and no matter what is the price of other goods X, as long as we operate in the part of the X - HC space of Picture 2.2, where indifference curves are becoming from vertical to downward sloping to horizontal, including the origin, the optimal amount of demanded health care for zero price will always correspond to individual's health care bliss point $\overline{HC}_i$. Hence, with increased disposable income, the individual demand for health care in the price – quantity space will in fact turn to the right around the point $\overline{HC}_i$.

What will happen at the aggregate level? Assume that an increase of disposable income applies in general to all members of a society, i.e. that it actually reflects an increase of social wellbeing (which can be measured perhaps by gross domestic product)[51]. Then, as the aggregate demand is a horizontal sum of all respective individual demands, there is no change in the social health care bliss point, and thus the demand curve follows the behavior of individual curves and turns also to the right around this optimal aggregate health care consumption point $\overline{HC}$.

The second effect of increased social wellbeing influences the demand for health care, as was already mentioned, through change in individual health risks. In general, a poorer social status makes a person to be more predisposed to some illnesses, i.e. to have a higher individual health risk[52]. Hence, an uplift of a person's living condition will most likely lead to decrease of his subjectively viewed optimal $\overline{HC}_i$. On the aggregate level, one would thus suppose that a general improvement in individual social statuses[53] has to result, naturally, in a

[51] For simplicity, let us assume that across the given society an individual income either increase or doesn't change.

[52] According to Donaldson and Gerard (1993), there is a negative dependency between individual social status and personal health risks. Some justification of this statement can be also found in Wagstaff (1985): Though in his paper Wagstaff concentrates on critique of H. Brenner's time series and consequent results, he himself ends up with a statement that his critique does not reject conclusions of other authors that unemployment (which can be taken in the this thesis as a proxy for social status) can have adverse effects on physical health.

[53] Again, let us suppose that over all members of the society an individual's social status either ameliorates or keeps its status quo.

decrease of the size of aggregate $\overline{HC}$, and therefore also in a proportional move of the demand curve to the left.[54]

The following Picture 2.8 illustrates both of the effects of a sudden social wellbeing increase. The effective demand D^{ef} does not change with the first effect of improved social wellbeing, that is with increased disposable income, even though the demand curve turns to the right around the social health care bliss point $\overline{HC}$. The reason is that the desired health

[54] Please note that what we are dealing here with is a static situation in which there occurs a sudden change in social wellbeing as defined above. According to the model of effective demand and our line of reasoning, in reality in case of such a sudden increase of social disposable income, we should observe either a decrease in society's total health care consumption, or no change if the effect on individual health risks is not significant, and so, supposing the supply curve is not effected by this change, also a decrease, or no change, in total health care spending. It should be pointed out that this conclusion is not in contrast to empirical evidence from international comparisons on total health care expenditures. According to Gerdtham and Jonsson (2000), p.45, health care expenditures' income elasticity is estimated to be higher than zero and close to unity or even higher than unity. These findings however point to health care market dynamics and thus cannot be used to oppose an outcome of a static model construction.

Nevertheless, in long term, we can explain such empirically observed development based on two facts. First, richer countries are those who are world leaders in research. Thanks to their wealth, they have also a higher absorption capacity than the poorer countries to implement sooner and faster new scientific and technological findings into practice. New technology and processes of treatment are however in general more financially intensive, and thus drive production costs of health care up. As a consequence, health care supply curve shifts up and the equilibrium health care price (in case effective demand does not change, ceteris paribus) increases faster in richer countries than in poorer ones. Hence, when analyzing only a one-year cross sectional data, we can find that there is a positive dependency between national wealth and total health care expenditures. However, this doesn't say anything about time dependency between these two variables.

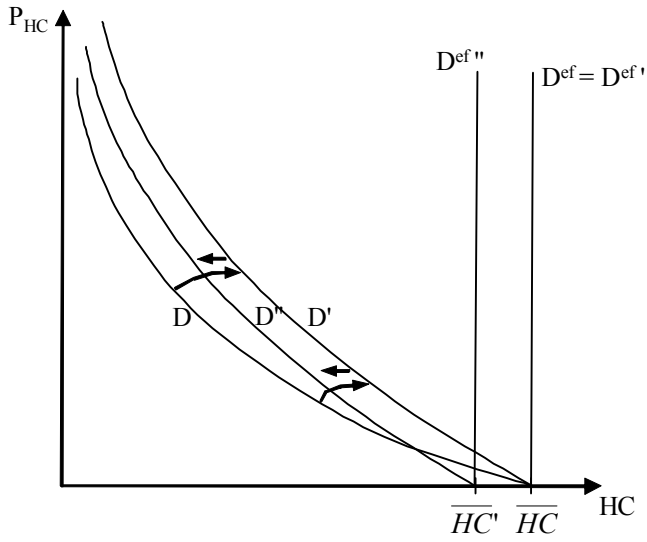
Second, people in richer countries are closer to scientific research than people of poorer countries who invest less into R&D. So, not only are they sooner aware of the fact when some new invention is developed, but they have also a historical experience that new things get quite fast implemented. This is however not in general a case of poorer countries. Hence, people in better-off countries have higher expectations concerning the chances of health care, which moves their demand further to the right and increases the total demanded health care for a zero price. As a result, there can be a positive correlation between total health care expenditures and wealth across countries, even if the supply curve did not change with increased income.

Moreover, the very same authors who brought the aggregate (cross country) empirical evidence also admit that there is a variety of empirical studies done on households that reveal quite a low income elasticity for the utilization of health care (Gerdtham and Jonsson, 2000, p. 23), which may support our arguments given above.

care consumption for zero price, which is the only determining point of the effective demand, stays the same.

Nevertheless, the aggregate health care bliss point $\overline{HC}$ changes with the second effect of improved social wellbeing, since it directly accumulates all positive changes in individual health risks. So, the move of the demand curve from D' to D" is accompanied by the shift of the aggregate effective demand to the left, i.e. from $D^{ef'}$ to $D^{ef''}$.

Picture 2.8: Demand curve shift due to improved social wellbeing

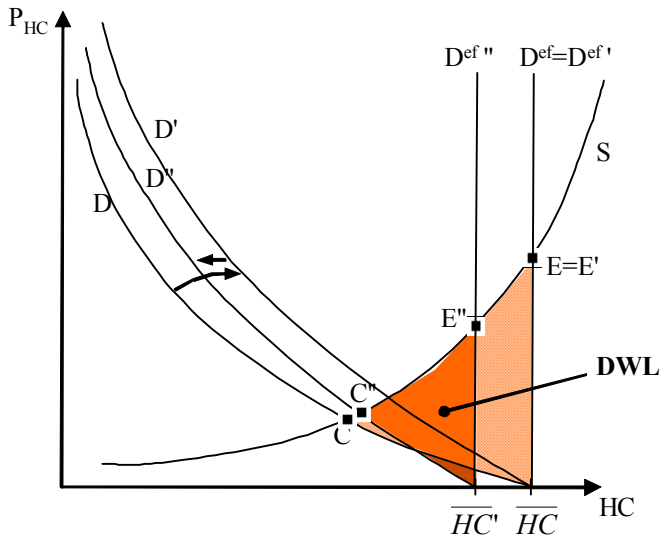


Now, let us look at the impact of this change on social welfare, that is on the dead weight loss, which the system of publicly funded health care insurance system produces. Decomposing again the overall impact of improved social wellbeing, we can see at Picture 2.9 that the first effect (the turn of the demand curve to the right) results actually in reduction of the size of the dead weight loss in the extent of the area between the former demand curve D and the instrumental demand curve D', bounded by the supply curve S. The second effect, which results in the shift of the demand curve from D' to D", then brings at the same time increase of the dead weight loss (which partly offsets the decrease from the first part of the effect) and also a decrease of the dead weight loss induced by the shift of the effective demand to $D^{ef''}$.

Hence, the overall effect on social welfare is uncertain. The outcome depends on the exact elasticity of the old and the new demand curves, the supply curve, and the change in the

size of the aggregate health care bliss point $\overline{HC}$ (i.e. on the sensitivity of aggregate health care bliss point to the change in individual health risks).

Picture 2.9: Welfare change due to improved social wellbeing



Note: For illustrative purposes the shift of effective demand curve due to improved individual health risks and associated smaller total social health care bliss point $\overline{HC}$ is exaggerated.

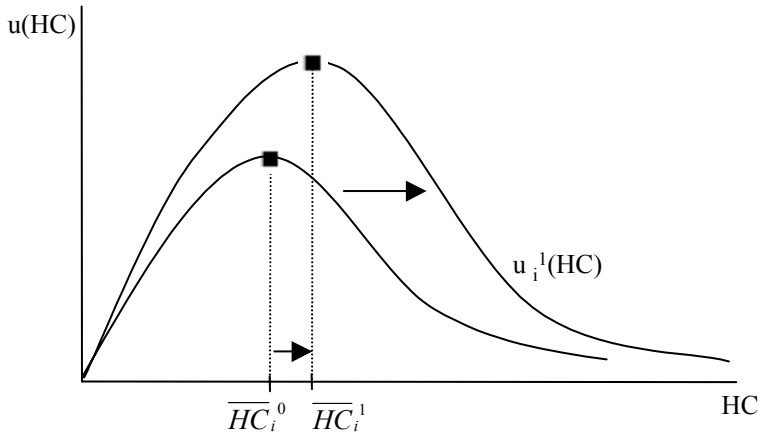
Speaking in terms of the social welfare function (SWF) defined in section 1.3, the uncertain effect of social wellbeing improvement on the size of dead weight loss means that the impact of the change of this factor on the social welfare is also not clear. The increase of society's living standards has no influence on the two variables of social welfare function other than the dead weight loss DWL. There is no change in social solidarity under the variable SOL, nor is it rational to suppose any change in the access to health care defined as having a positive externality attribute (variable ACCESS), since we assume a universal health care insurance coverage. So, any modification in the size of the dead weight loss will directly result in change of social welfare function in the same direction.

2.4.2 Medical technology progress

Now, think about what would happen with individual health care demand curve, if individual points of health care saturation change because of a substantial medical technology progress. For simplicity, assume that preferences for basket of all other goods X apart from

the health care good (see chapter 2.1) remain unchanged and there is an important increase in personal utility concerning the impact of health care. This increased utility is due to the said technological progress that succeeded in ameliorating the efficiency of health care in improving or maintaining individuals' health status (and hence allowing a higher level of "health" to be achieved), and / or in decreasing individual disutility from the actual process of health care consumption. Thus, speaking in terms of equation (2.1) and Picture 2.1, with technological progress the individual marginal utility from improving or maintaining one's health status is higher for every unit of health care consumed, whereas / or the marginal disutility from the actual process of health care consumption is smaller for every unit consumed. Therefore, the peak of the curve at Picture 2.1, displaying total individual utility u(HC) as a dependant on individual's total amount of health care consumed HC, moves up and to the right. Naturally, this results in higher optimal (desired) individual quantity of health care consumption $\overline{HC}_i$. The following Picture 2.10 illustrates the dependency of utility change.

Picture 2.10: Utility change due to technological progress

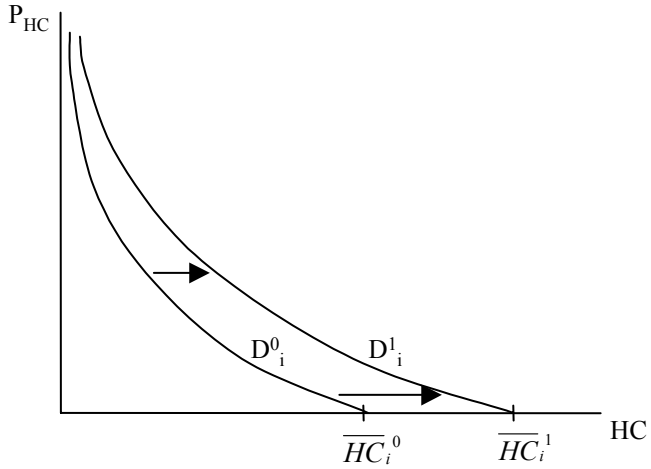


In the logic of Picture 2.2, such a technological progress means a horizontal shift of the general individual bliss point $\overline{Q}_i$ to the right. Now, the indifference curves will have to adjust to the new bliss point. For each quantity of health care HC, an individual will be on a higher indifference curve.

What will happen with the demand curve? Because preferences for other goods X stay the same, the former price-consumption curve is no more optimal, since for each price of health care the old choice sets do not represent any more places of tangency between a budget

constraint line and an appropriate highest feasible indifference curve[55]. For a given price, an individual will therefore ask a bigger quantity of health care. Hence, individual health care demand curve shifts to the right, as it is shown on Picture 2.11.

Picture 2.11: Shift of the demand curve due to technological progress



Technological progress is such a thing that does not have an impact only on selected individuals, but in general on all members of a society. Thus, we can generalize the conclusions of previous paragraphs: To some extent, a specific technological improvement affects each individual's point of desired health care consumption. We can consider that some are affected more and some less, but it is rational to assume that no individual health care bliss point, in terms of desired quantity of health care, actually diminishes. Hence, a technological progress described above shifts not only individual health care demand curves, but an aggregate demand curve as well, since the aggregate social bliss point of desired health care is a sum of individual bliss points.

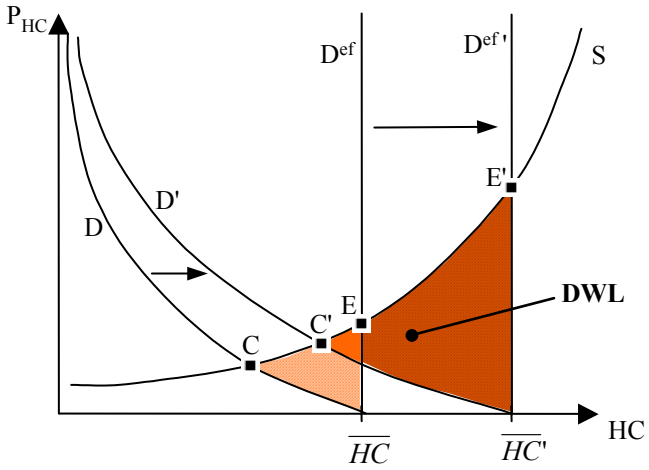
From the impact of technological progress on the aggregate health care demand curve, we can also derive its influence on the effective health care demand. As has been pointed out in the previous section on social wellbeing improvement, the aggregate health care bliss point $\overline{HC}$ is the only determining factor of the effective demand curve in the price – quantity space. Hence, the move of the point $\overline{HC}$ results also in the move of the effective health care demand curve D^{ef} to the right.

[55] See Varian (1995) for more on price consumption curves and derivation of the demand curve.

Concerning the social welfare and the social welfare function, a technological progress per se does not mean any change in social solidarity as defined under the variable SOL (see chapter 1.3). Nor is it reasonable to assume any negative impact of this factor on the variable ACCESS (access to health care defined as having a positive externality attribute). However, there is a significant impact of technological progress on the dead weight loss generated by a health care market under publicly funded health care insurance system. This modification in the size of the dead weight loss then directly results in change of the social welfare, since there is an inverse proportion between the two.

The question is, whether a substantial technological progress contributes to an increase or a decrease in the size of the dead weight loss on the market under consideration. The following picture illustrates the issue in case of a health care market with publicly funded insurance providing the first-dollar coverage.

Picture 2.12: Welfare change caused by technological progress



Note: For illustrative purposes the shift of the effective demand curve caused by the technological progress is exaggerated.

Though the effect of technological progress on the aggregate health care bliss point $\overline{HC}$ and the effective demand curve D^{ef} is exaggerated at Picture 2.12, from the triangle resemblance of areas CE$\overline{HC}$ and C'E'$\overline{HC}$' it is clear that unless the supply curve S is horizontal, i.e. infinitely price elastic, the new dead weight loss will be always bigger than the former one.

Hence, with a substantial technological progress, the size of the dead weight loss on the health care market with publicly funded insurance increases, and, consequently, the social welfare diminishes. The only exception is the case of infinitely price elastic health care supply curve, when the dead weight loss and the derived social welfare remain the same even when a significant technological progress takes place.

2.5 Means of demand regulation

The two factors that the previous chapter has talked about, an increase in society's wellbeing and a medical technology progress, are exogenous of any health care system. The two still preceding phenomenon, moral hazard and demand inducement, are resulting factors of an insurance system's own. Yet, we have not yet spoken about factors emerging out of the inner organization of a health care system, i.e. factors used to regulate either demand for or supply of health care. The regulation of demand comes always from the intent to restrict an overutilisation of health care, which is a result of moral hazard and demand inducement.

Actually, the regulation of health care demand can be either of financial nature (imposing some direct costs on health care consumers), or of an objective (material) nature (limiting the quantity available for consumption). The first coming subsection concerns the first way of mentioned health care consumption rationing: out-of-pocket payments. There are two different concepts of these to be treated in following paragraphs. One is proportional approach to direct payments, and the other a fixed marginal payment not proportional to the absolute price of consumed care, which is sometimes referred to as user charges (or user fees).

The second way of consumption rationing, concerned with some quantity limits, is worked out in the second section of this chapter. The example of waiting times is used there.

2.5.1 Out-of-pocket payments

What out-of-pocket payments, i.e. direct payments by consumers to providers at the point of health care consumption, actually do is that they may reduce the scope of demand inducement and moral hazard, and may also reestablish some price elasticity of the original demand in the form of the effective demand for health care. As we are going to see, a non-zero price elasticity results in a substantial reduction in the size of the dead weight loss compared to the case of no co-payments. Therefore, out-of-pocket payments can play an

important role as a mean to reduce some enormous social welfare losses caused by publicly funded health care insurance systems.

Yet, speaking about social welfare, we have to always bear in mind as well the other two variables of our social welfare function, ACCESS and SOL, which represent positive externality and important social solidarity values and their positive impact on European societies' utility, and which may be influenced in a negative way by direct payments introduction. Thus, the size of out-of-pocket payments has to be considered carefully and the opposing impacts on different social welfare function variables have to be balanced before formulating any policy recommendation.

Proportional out-of-pocket payments

Let us start with out-of-pocket payments that are to some degree proportional to the real price of health care (i.e. direct payments by a patient amount to a given proportional part of the real health care unit price). By introducing such out-of-pocket payments, a part of costs becomes obvious and transparent for an ordinary consumer. At this situation, consumers in general start to take account of this artificial price of health care in their proper decision-making about health care utilization. Furthermore, they also become once again limited by their individual budget constraint. As a result, the effective demand is no more price inelastic. It becomes sensitive to the price level.

The awareness of consumers (not only patients!) about a bit of the real health care price makes them less susceptible to delegating authority to their physician. Of course they still don't have full knowledge and perfect information about everything what concerns their proper health status and means of available medical treatment, but still they do not delegate the authority as automatically and completely as they would otherwise do under a system of zero out-of-pocket payments. Now, the direct payments represent the really *their* financial means and influence right away their own disposable income available for consumption of other goods and services.

The increased interest that patients show in decision-making about their health care needs further constitutes a new barrier for providers of health care to exploit their asymmetric information. By being more directly (and personally) interested in paying for the care, consumers, as all "normal" principals in principal-agent theory, want to be more involved in taking the decisions and do not ignore their principal's role in the relationship with a

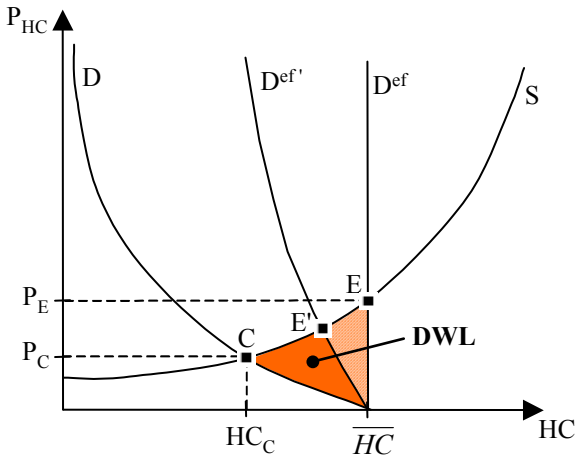
physician. As a result, providers have less opportunity to exploit their advantage from existence of asymmetry of information at the implicit cost of their patients.

Besides limiting the demand inducement, proportional out-of-pocket payments also decrease the extent of consumers' moral hazard. People bear some direct costs, proportional to their health care need, so they have more incentives to invest in their less risky behavior and healthy life style to avert some states that might require additional health care.

Both of the effects of proportional direct payments, the constraints of demand inducement and moral hazard phenomenon, have the same impact on the aggregate desired amount of health care, $\overline{HC}$, and thus also on the position of the effective demand for health care, to the intent that it brings the desired (or subjectively optimal) point of $\overline{HC}$ closer (if not fully back) to its original level without demand inducement and moral hazard effects (i.e. to the level of desired health care that corresponds to point $\overline{HC}_i^0$ if no insurance exists – see footnote 47 in section 2.3.3). Only from this impact we can already conclude that the loss of social welfare, represented by the dead weight loss, diminishes.

Moreover, there is also a turn in the effective demand curve for health care due to its partially restored price elasticity caused by proportional direct payments introduction. This move brings about some more positive changes in social welfare, as is illustrated on following Picture 2.13.

Picture 2.13: Proportional out-of-pocket payments



Note 1: The picture captures only the effect of reestablished non-zero price elasticity of the demand curve and not the effects of moral hazard and demand inducement constraints.

Note 2: The shift of the effective demand curve at the picture corresponds to out-of-pocket payments amounting to roughly one third of the real health care unit price.

From the above picture it is quite clear that by making the effective demand for health care price elastic, that is by making the effective demand curve to actually turn anticlockwise around the point $\overline{HC}$, the dead weight loss acquired by a society diminishes by the size of the area between points E, E', and $\overline{HC}$.

As we know from the social welfare function defined in chapter 1.3, a decrease of the dead weight loss (variable DWL) implies an increase in social welfare. Hence, by the channel of the dead weight loss, out-of-pocket payments introduction surely constitutes a positive message for overall social welfare. However, the message is not as clear in terms of the other two social welfare function variables. Concerning the ACCESS variable, based on its definition we can suppose that if we can distinguish between types of health care that possess some positive externality (in terms of 'physical health' or 'safety' externality – see chapter 1.3) for other members of a society, and those without such a feature, we should be also able to limit the out-of-pocket payments only to health care that does not have any impact on ACCESS variable, that is on the type of health care without a positive ('safety') externality feature. In this situation, an introduction of direct payments would not have any negative impact on the ACCESS variable. Nevertheless, in general we are not able to draw a clear line between the two types of health care. Thus, we should rather always suppose that by introducing some, still partial, direct payments, we influence also the ACCESS variable.

A similar case occurs with the SOL variable, which represents the level of social solidarity on three different levels (as described in detail in section 1.2.2). By introducing some direct payments, the type of solidarity, which is harmed the most, is the solidarity between different health risks. The other two solidarity levels are for sure also affected, but the one between low- and high-risks groups of people is the most obvious.

Hence, not to exceed the positive effect of reduced dead weight loss from out-of-pocket payments on social welfare, we have to carefully balance the exact size of the co-

payments to keep the negative effects on social welfare from changes in ACCESS and SOL under control.[56]

To show that such a balancing is possible let's return to the definition of all three social welfare function variables, namely to their first and second derivatives. Recall that social welfare function is decreasing in dead weight loss [DWL] variable and increasing in ACCESS and SOL variables (between their extreme values). Furthermore, the social welfare function is concave in all of these three mentioned variables. Now, imagine a situation where all three variables are approaching their maximal values (which is, based on the definition of our social welfare function SWF, exactly the situation of a health care system with publicly funded health care insurance system providing a first-dollar coverage and free and unlimited access to any health care for all members of a society). In this supposed situation, a marginal change in each of the three variables will result in a different impact on social welfare: The biggest influence will definitely be from the dead weight loss variable change, whereas the effect of both the ACCESS and the SOL variables on social welfare will be more or less insignificant. This fact is given by the signs of the first and second derivatives of the respective variables, which determine that the impact on social welfare from a marginal change in ACCESS or SOL variables near (or in) their extreme values converges to (or is) zero, and at the same time the impact of a marginal change in the dead weight loss variable near its extreme value is highly important (converging even to an infinitely high impact).

Hence, by introducing a modest proportional out-of –pocket payments, we can expect a noticeable increase in social welfare resulting from the change in the dead weight loss variable, which will be probably only partly offset (if at all) by a negative impact of marginal changes in ACCESS and SOL variables.

User charges

The second type of out-of-pocket payments, which were mentioned at the beginning of this section, are fixed marginal payments not proportional to the absolute price of consumed care, which are sometimes referred to as user charges. The case of user charges and their impact on the effective demand for health care is to some extent similar to the case of

[56] In practice, in addition to co-payments introduction, countries usually set some upper limits (caps) on individual out-of-pocket payments, in general on a yearly basis, with the objective not to hurt too much the solidarity principle of their health care system.

out-of-pocket payments that are proportional to the whole cost of patient's health care consumption, but at the same time it is also quite different.

User charges are usually set to be equal to a fixed defined amount per a health care consumption event, no matter how many units of health care are consumed at once and so how much does the health care in total actually cost. This definition implies that for all health care consumption events, the direct (and thus the only visible price) for a consumer is the same.

Concerning the constraining of moral hazard and demand inducement phenomenon, the argumentation is the same for all types of out-of-pocket payments, i.e. the conclusion of above paragraphs does not apply only to proportional direct payments, but also to user charges. By making some costs, no matter to what degree only partial, directly obvious for a consumer, there definitely is some moral hazard behavior averting, that would otherwise not take place under a fully publicly funded health care insurance system with a first-dollar coverage. The result of this fact is the position of the effective demand for health care curve in the price-quantity space more to the left compared to its position with unrestricted moral hazard occurrence (i.e. before user charges introduction). Unfortunately, we are not able to further estimate, whether proportional direct payments work better or not than user charges as means to restrict an individual effective demand back to subjectively optimal health care need bliss point $\overline{HC_i}$ when taking before insurance introduction. If concerning only some expensive care that could be avoided by more careful and less risky individual behavior, we can suppose that proportional direct payments serve better this purpose, since they represent a bigger financial threat for a consumer than user charges, which are usually set to be only of a moderate size. However, if speaking about some less expensive health care need events whose frequency may be importantly influenced by moral hazard phenomenon brought about by insurance, in this case the user charges may work better, because even though they are only moderate, for an ordinary and the most common undemanding health care they may represent a significant part of the whole cost per event.

Speaking about demand inducement avoidance, through user charges introduction there is also for sure some limit placed on inducing the demand via strengthen role of individual consumers in their principal role towards a physician (agent), as they (i.e. consumers) get to bear personally at least *some* (even though fixed) cost of their health care. However, it is quite clear that this inducement constraint is not as strong as in the case of

proportional direct payments, because consumers are not individually interested on the whole scope of their health care consumption, but only on the number of health care events that occur. The thing is that with proportional direct payments, consumers get the feeling of their private total health care cost increase in accordance with their health care units consumption. On the other hand, with fixed user charges the cost of all types of health care for an individual consumer is one. Hence, an individual consumer does not make a difference between consuming a very expensive care in enormous volumes and a less expensive care with limited volume that would lead to the same health status outcome, as it has no direct impact on his personal costs. Therefore, we can say that on contrary to moral hazard restriction, with demand inducement it is clear that with user charges there is more space left for the demand inducement than in the case of proportional direct payments.

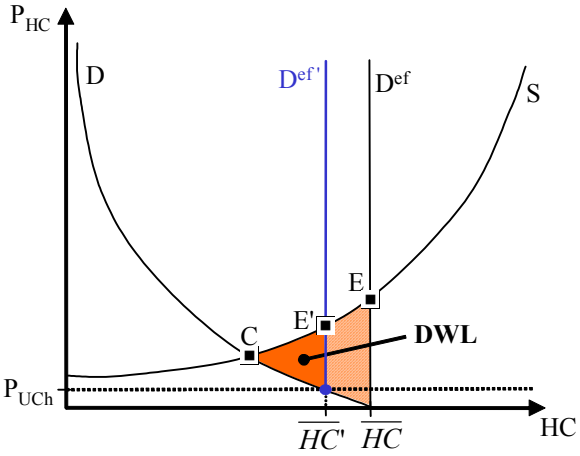
Besides positive welfare aspects of any out-of-pocket payments on restricting the extent of moral hazard and demand inducement phenomenon, there is also another effect of user charges that takes place on the side of the effective demand and which has a positive impact on the size of social welfare through the dead weight loss decrease. With fixed user charges people are constrained directly by their disposable income und thus no more think about health care consumption as with zero price[57]. This is the case because user charges represent an apparent price for a consumer, which is fixed at a level P_{UCh} ('UCh' as 'user charges') for a health care event. Hence, even though this connection of a user fee per health care event does not contribute to any higher price elasticity of the effective health care demand curve, as is the case of proportional out-of-pocket payments, it still effects the position of the effective demand curve. There are two possible outcomes of user charges introduction depending on the overall legal arrangements.

The first outcome is illustrated on Picture 2.14 and represents a setting in which people are obliged to pay P_{UCh} for *all* health care events, even for those that they individually

[57] As was stressed earlier, each single person is not really able to think about some global social budget constraint and furthermore has no private incentives to restrict in some sense his or her proper behavior according to this global financial constraint, as he or she has no guarantee that other members of a society will do the same. Therefore, with zero direct payments for health care consumption there is no connection for an individual between his economized behavior and the insurance contribution that he is obliged to pay.

value less than P_{UCh}[58]. In this case, the effective demand curve moves to the left from its original position in the price-quantity space: people demand in total the quantity of health care $\overline{HC}'$, which is smaller than original $\overline{HC}$. The amount of $\overline{HC}'$ is given by the point of intersection of the price elastic demand curve D and the consumer-artificial price level P_{UCh}. However, if people are forced to pay directly for all health care the price P_{UCh}, a rational outcome of such setting would be that people won't consume health care in events when their personal valuation of such health care will be in fact less than P_{UCh}. Thus, the new effective health care demand curve $D^{ef}{}'$ actually does not intersect the quantity axis HC; it is price inelastic (as the original effective health care demand D^{ef}), i.e. vertical, but only above the price level P_{UCh}.

Picture 2.14: Fixed user charges – case 1



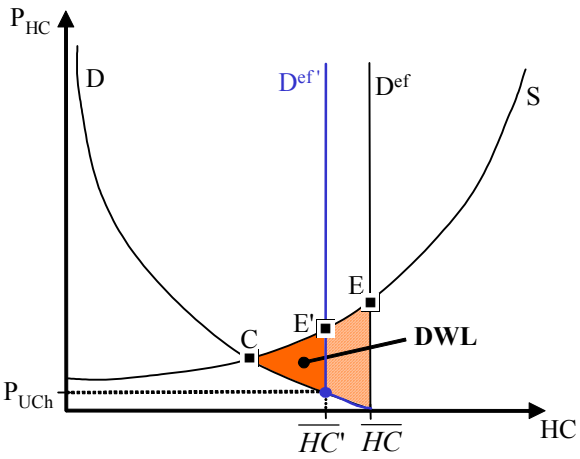
Note: The picture does not capture the effects of moral hazard and demand inducement constraints due to user charges introduction.

The second possible outcome of user charges introduction on the effective demand for health care is illustrated at Picture 2.15. In this case, the user charges are set as a maximum price that people pay for a health care consumption event. Thus, consumers are aloud to pay less then P_{UCh}, if some kind of health care has a smaller value for them.

[58] Individual valuation of health care is meant to the intent that people make a decision based on their private cost-benefit analysis, which takes in account all disutility from health care consumption of financial, as well as of non-financial nature, and the utility gains from improving or maintaining their proper state of health. It is the same concept of health care valuation that is used throughout the paper.

However, we can see that such a setting does not have an impact on the resulting market price and total health care consumed compared to the first case of user charges arrangement. It is still set by the vertical, price inelastic part of the effective demand curve above the price level P_{UCh}, though below that price level the effective demand curve copies the price elastic demand curve D.

Picture 2.15: Fixed user charges – case 2



Note: The picture does not capture the effects of moral hazard and demand inducement constraints due to user charges introduction.

To sum up, welfare impact of user charges settings is the same, no matter whether user charges are set as a fee per health care utilization or as a maximum price that consumers pay directly, out of their pockets, for health care consumption. In both cases the social welfare loss represented by the size of the dead weight loss, which is caused by the presence of publicly funded health care insurance system, is reduced by the shaded area between the supply curve S, the demand curve D, and the two effective demand curves D^{ef} and D^{ef}'. The total health care publicly funded insurance system's price for health care decreases as well as the health care utilization.

Concerning the impact of user charges on total social welfare given by the social welfare function of chapter 1.3, exactly the same argumentation applies as with proportional out-of-pocket payments mentioned earlier. Because of the concavity of social welfare function SWF in all three independent variables (DWL, ACCESS, and SOL), a marginal change of these near their extreme values, represented by introduction of modest health care

user charges, has a significantly bigger positive impact on social welfare via the dead weight loss reduction than negative impacts of decrease in ACCESS and SOL variables.

There is also one more interesting thing about the second case of user charges arrangement. If we set user charges as some maximum price that a person is directly paying on his own in case of health care utilization, we can interpret at Picture 2.15 the new system's equilibrium point E' as the equilibrium of publicly funded health care insurance system. The rest of the effective demand curve, which corresponds to the price elastic demand curve D below the price level P_{UCh}, then represents a demand for health care that can be saturated outside the publicly funded health care insurance system. Although we have been so far working only with one supply curve S that is well decisive concerning the resulting system's price, and we have neither worked it out well in detail, if we assume that a supply curve S is also to some extent affected by insurance arrangements, then there is no reason to suppose that there may not develop another supply curve on the rest of the health care market where effective demand is price elastic, and thus we can also expect a second market equilibrium to develop out of the insurance system. In such a case there would be another social welfare increase, as the new equilibrium would bring an extra consumer, as well as producer, surplus from the additional health care market trade. There would, of course, be no additional dead weight loss emerging from this extra trade, since the resulting price of the new equilibrium would be by definition perfectly market clearing.[59]

2.5.2 Waiting times

Next to the direct, or out-of-pocket payments, there is another way how a health care demand can be rationed. In this case we do not speak about a financial demand rationing, as the preceding section did, but about an objective (or material) nature of rationing a health care consumption. Under an 'objective nature' we mean an existence of a limit on feasible quantity of health care available for consumption, which results in creating a new factor that enters

[59] There is some empirical evidence, which supports outcome of the effective demand model with respect to out-of-pocket payments, from countries that have recently introduced some co-payments measures. For example in Germany, a 10Euro "entrance fee" has reduced doctors' visits by 10 – 15 per cent already 6 months after its introduction in January 2004. Implicitly, there is also a very significant decrease in German's health insurance funds' expenditure on drugs (Williamson, 2004). Similar highly significant positive results from user charges introduction can be found in the Slovak Republic (see Pažitný and Zajac, 2004).

into individual decision-making about health care consumption. This factor is an individual time constraint.

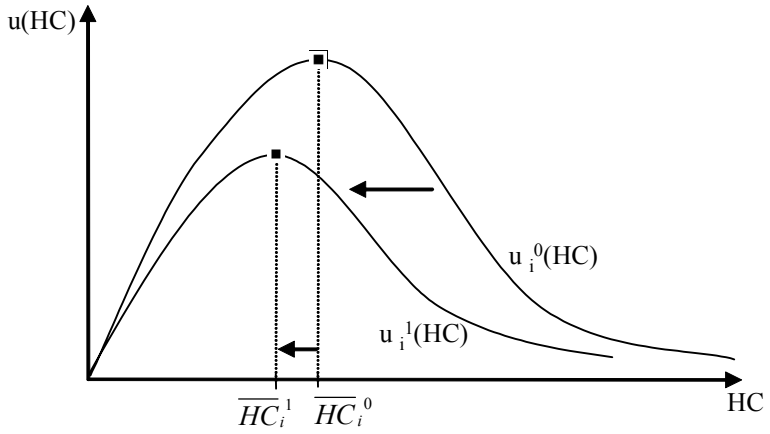
There are two possible sources of such constraint. The division corresponds to differentiating of health care into primary (general) care and specialized care (ambulatory as well as in-patient). First, utilization of a system of 'gatekeepers', in which primary (general) physicians serve as important gate-keeping elements of a system, whose role is to guide an individual consumer (with incomplete information and limited knowledge) through a health care system, may lead to emergence of some non-negligible waiting times before an individual is actually admitted to consume a health care, whether primary or specialized, in case that there is not a sufficient number of primary physicians for the whole population. Second, waiting times emerge when a consumer is obliged to wait in an imaginary queue for a specialized health care because of a shortage of specialized doctors and medical devices (i.e. though there may be a sufficiently enough of primary doctors, patients get to wait for a planned surgery or for a consultation at an ambulatory specialist, or for some other kind of special examination, whether done on an out-patient or in-patient basis).

The following analysis of demand rationing concerns mainly the first source of time constraint, i.e. via gate-keeping, or more in general a time constraints due to waiting times before the first contact of a potential health care consumer with a doctor occurs (this of course does not concern any necessary and urgent health care and first aid).

If we get back to our analysis of individual preferences and utility of chapter 2.1, waiting times can be viewed as representing an opportunity cost of consuming health care. We can even in some cases measure it by financial means, if we take in account the fact that a person, who is consuming health care, is actually loosing his or her respective income, because he or she cannot work at the same time (i.e. the concept of opportunity cost represented by lost profit). Hence, waiting times constitute just another disutility of the actual process of health care consumption. Earlier, in equation (2.1), chapter 2.1, the disutility of health care consumption was illustrated for instance by pain from the actual process of curing. So, we can think about waiting times as extending a unit disutility from the process of health care consumption. Furthermore, if we assume that for a more "scarce" health care (for instance a specialized care) waiting times are higher, we can suppose that a marginal disutility from health care consumption is increasing with increased quantity of individual health care units consumed.

We can illustrate the emergence of waiting times and their impact on individual utility as a shift of the curve relating individual utility to quantity of health care consumed, as shown at Picture 2.16. For each unit of consumed health care the total individual utility decreases due to introduced nonzero (significant) waiting times.

Picture 2.16: Individual utility change due to waiting times introduction



From Picture 2.16 it is obvious that thanks to waiting times the size of an individual subjective point of health care need saturation $\overline{HC_i}$ in fact decreases. This conclusion is however too strong, as we cannot be sure that all people – consumers of health care regard a waiting time as an extra (and significant) opportunity cost (there is more space devoted to the analysis of waiting times on different socio groups in following paragraphs).

However, it is clear that waiting times alone don't have under any circumstances a positive impact on the size of an individual subjective health care need bliss point $\overline{HC_i}$. Therefore, we can generalize, that waiting times have either a positive influence in terms of individual health care demand rationing, or they have no impact. From this follows, that on the aggregate level the total social health care need bliss point (i.e. the sum of individual bliss points) $\overline{HC}$ diminishes in its size, and its exact reduction will depend on the share of people sensitive to waiting times in the whole population. If we suppose that this share of people is significant enough to register, than we can say that health care quantity limits referring to waiting times before the first contact of a potential health care consumer with a doctor occurs have an impact on the position of the effective health care demand curve in the price-quantity space through the shift of the only decisive point for this effective demand curve, which is the

point $\overline{HC}$. Because the supposed move of the effective demand curve is to the left (towards the origin), we can demonstrate the impact of waiting times introduction on the social welfare in terms of the size of dead weight loss, as exactly the opposite than is illustrated at Picture 2.12 (section 2.4.2), where the impact of medical technology progress is shown.

Hence, waiting times have positive impact on social welfare via dead weight loss reduction. But we still have to bear in mind the other two variables of the social welfare function of chapter 1.3, and that is the social solidarity, represented by the SOL variable, and the level of 'safety' externality encompassment (variable ACCESS).

The very interesting thing about waiting times (when referring only to waiting times before the first contact of a physician occurs; apart from the urgent and necessary health care need cases) is that contrary to any precedingly concerned health care demand regulating means, the most vulnerable groups in case of these waiting times are not the poorest members of a society (meaning both financially and regarding their proper state of health), but those that are usually regarded by societies as being 'better-off'. How can this happen?

Waiting times affect usually the most those, who do not have "the time" – i.e. those in productive age, who work, and even further those who work hard and a lot. On the other hand, the part of a population that does not work can spend de facto any time in a doctor's waiting room and they are not discouraged from health care consumption by the length of waiting. Hence, significant waiting times to actually get in touch with a doctor (remind again that this does not concern necessary and urgent health care) affect more people who are short of their free time than those who have plenty of it. So, the time represents an additional budget constraint faced by consumers. What is interesting is the fact that those, who would be usually facing the toughest financial budget constraint, are facing the softest time constraint! The reverse case applies as well.

In a publicly funded health care insurance system with universal coverage and free access to any health care the financial constraint does not apply to people on an individual level. On the other hand, those who face the toughest time constraint (i.e. those who work) usually contribute the highest insurance fees into the system, since in a publicly funded insurance system contributions are in general based on individual ability to pay. And moreover, people of the active age are in general also of lower health risk, i.e. of lower health care expenditures on average.

Hence, waiting time represents an opportunity cost of health care consumption, which has a different value for different socio groups of people. If we think about waiting times in terms of lost profit, then we can treat its cost for people who work as an implicit price of health care consumption. On the aggregate level, the waiting times then shift the effective health care demand curve anticlockwise around the aggregate health care consumption bliss point $\overline{HC}$, which is a very similar effect to that of proportional out-of-pocket regulation payments (see Picture 2.13), only this is done in a space where on the horizontal axis there is as usually the quantity of health care and on the vertical the implicit price of health care represented by the lost profit due to waiting for health care consumption. However, the influence on different income groups is exactly the opposite compared to the direct payments introduction. There are now the "wealthier" of a population (i.e. those who work) who are impacted more, i.e. whose effective health care demand curve turns more to the left, than those who belong to financially more vulnerable groups (non-active age groups or unemployed).

The question then is, whether this is still a desired social solidarity? The better-off groups of people are now solidary with the rest of the population not only financially, but also factually: there is a question whether we can still speak about the validity of principal of "equal treatment for equal need", since when some two different individuals in a same health care need might be facing different time constraints, they will never consume the same health care treatment.

Thus, the variable in the social welfare function of chapter 1.3 representing social solidarity (SOL) is definitely influenced by waiting times introduction. The question then is, whether European societies regard in general this changed social solidarity as a positive or a negative aspect in terms of the whole society's utility; such issue is however a matter of public choice theory, which is out of scope of this thesis due to its only limited extent.

Part 3 : Extension of the effective demand model

The model of effective demand for health care of part 2 encompasses some essential outcomes of health care markets with publicly funded health care insurance systems. Equally, as we have seen, the model can be also to illustrate results of introduction of some demand regulation measures on the overall health care sector as well as on the social welfare.

However, as it is only a model (and, moreover, quite simple one), it has of course a lot of imperfections. One of the biggest imperfections is the fact that the model does not take an account of organization of the supply side of a health care market and the organization and functioning of associated health care insurance market, which have been so far implicitly presumed, but never elaborated more in detail.

From this lack, there may arise some conclusions that may not fully reflect the reality. One of such conclusion is the one of section 2.3.2 on the dead weight loss. Based on the theory of consumer surplus, we have analyzed the distribution of welfare losses between demand and supply side agents of a health care market with publicly funded health care insurance system, and we have realized that there are always consumers who are harmed the most. Furthermore, the analysis and its outcomes suggest that in fact the providers of health care (i.e. doctors) should be fully satisfied with such settings of publicly funded health care insurance, because it does not do them any harm concerning their utility from health care market trade. However, we do not at all observe such satisfaction throughout European health care sectors. Hence, we must start to distinguish between health care providers, i.e. doctors and other medical staff, and health care insurance representatives to proceed any further in our analysis.

The extent of this thesis does not allow us to develop a micro analysis of each of the two mentioned health care sector groups of agents in such a detail as we did with the demand side, but nevertheless the crucial points are going to be mentioned.

The health care insurance system agents, i.e. simply the insurance funds, serve in most European health care systems as system administrators and/or managers. In others, they in general *try* to serve as system administrators and managers, even though there are situations where they carry on this function only theoretically and practically there is someone else (the State) who operates the system. Nevertheless, the insurance funds should be (and usually also are) the one who is responsible for financial stability of a health care system. In

their role of system's intermediaries (both financial and objective), they balance the demand for health care by consumers, driven by consumers' health care expectations, and the requirements of health care providers, driven by their historically given structure and organization.

Let's assume for this moment that each individual health care provider does not have a significant market power, i.e. that each of them individually is a price-taker. Even under this condition, it still applies that suppliers and their supply on the whole is decisive concerning the determination of a market-clearing price under a system of publicly funded health care insurance system, since this market-clearing price is defined by the point of intersection of the effective health care demand curve, which is vertical under first-dollar coverage insurance, and the aggregate supply curve, which is upward-sloping in the price-quantity space.

We have learnt in previous sections that under a system of publicly funded health care insurance, one should expect two phenomenon to occur: one is moral hazard and the second one a supplier-induced demand. Both of these phenomenon increase the effective demand curve, i.e. shift it to the right in the price-quantity space, than it would otherwise be due to reasons explained earlier. Such shifts create a tension for public finance that are devoted to health care insurance, because they increase both the quantity of health care required by policyholders and the unit price of health care demanded by providers (unless the supply curve is horizontal).

Further, the tension in public finance comes also from increased expectations of health care consumers in chances of modern medical treatment as technology develops rapidly and there is an important continuous progress in scientific knowledge. And last but not least, the tension in public finance is multiplied by the fact that though each individual consumer wants to consume over the time more and more of (subjectively 'free') health care, he or she is not that much willing to pay higher insurance contributions into the system. Hence, as a result the insurance funds of any European health care system face over the time tighter and tighter budget constraint in opposition to increasing demands expected to be satisfied by the system.

In such a situation, it is obvious that insurance funds would be searching a way out of this vicious circle. In general, they can either impose some administrative restrictions on the demand side or on the supply side of a health care market and thus regulate directly the behavior of one side of market agents and implicitly the behavior of the other side.

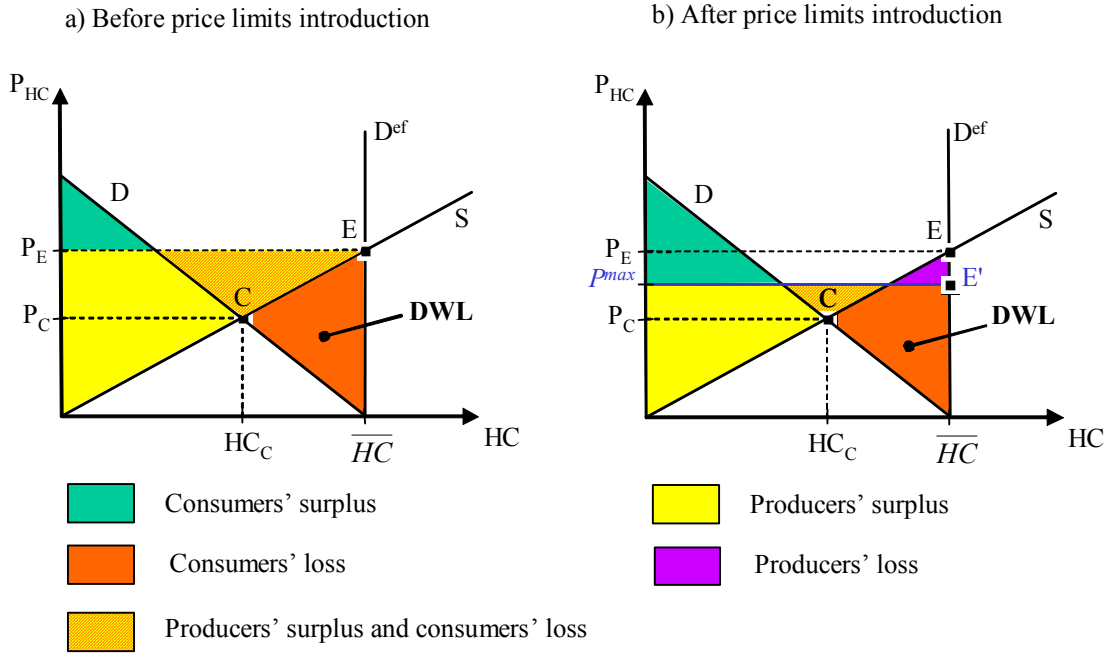
The demand side measures were described in chapter 2.5 together with their welfare implication. In following two sections we are going to treat some measures that may be introduced by insurance funds on the providers' side, though of course they also influence the welfare of consumers. In the third section of this part we are then going to analyze the role of insurance funds as health care system administrators and managers and consequently their influence on system's financial efficiency.

3.1 Price limits

One of regulating restrictions, which health care insurance funds can introduce on market for health care, are limits on price of health care. To be more precise, such limits concern a maximum health care unit price that an insurance fund would pay to a health care provider while not allowing for any supplementary direct payments by consumers. Yet, only price limits introduction would not constitute harm to health care providers in terms of a dead weight loss emergence. An important aspect is the succession, in which insurance funds start to apply this restriction.

Imagine a situation, where a market-clearing price and quantity of health care on a market with associated publicly funded insurance system is given by the point of intersection of the effective health care demand curve and the supply curve. Under the condition that there are sufficient financial means in the system, as a result quantity $\overline{HC}$ of health care is provided and consumed for price P_E. Then an insurance fund comes and requires health care providers to provide health care at a unit price no higher than P^{max} (which is smaller than the original P_E), but without compromising the originally provided volume of health care. Apparently, providers of health care won't be satisfied with this situation for reasons that are evident from Picture 3.1, which summarizes the welfare situation of the new setting.

Picture 3.1: Welfare diagram of health care market after price limits introduction



On the first part of Picture 3.1, there is the original situation. We can see that from this market settings consumers of health care are gaining the green-shaded area of surplus and at the same time are loosing the whole red-shaded (and also the striped-shaded) area of loss. On contrary, providers of health care gain the surplus equal to the yellow (and striped)-shaded area and acquire no loss from this market circumstances. This was the conclusion of section 2.3.2, i.e. before we started to actually distinguish between health care providers and insurance funds as system administrators.

Now look at the second part of Picture 3.1 to see what happens if insurance funds decide to introduce a unit price limit and simultaneously require health care providers to provide the same quantity of health care as before. The P^{max} represents a threshold above which the insurance funds won't reimburse suppliers of health care for their provided services. The new 'equilibrium' point moves from the original point E to point E'. As a consequence, consumers are now definitely better-off: Their surplus, represented by the green area, increases and at the same time the loss that goes at their expense diminishes. However, suppliers are now obviously worse-off: Not only that their surplus from health services provision decreases (see the yellow and the striped area), but moreover they start to acquire part of the social welfare dead weight loss that was originally at the expense of consumers.

Clearly, the overall social welfare dead weight loss stays in both cases the same. It is equal to the triangular area between points C, E, and $\overline{HC}$. Nevertheless, an independent observer could have a feeling, from agent's reactions on limit introduction, that situation of part b) is actually worse than situation of a). This is because each individual consumer is in fact still satisfied with his personal health service consumption (as the total health care consumption still equals the quantity $\overline{HC}$, which is a sum of individual subjective points of health care need saturation), and none of them is actually able to see some direct dependency between his private utility and his more economized behavior concerning his health care consumption. Hence, on an individual level, consumers would be equally satisfied (or potentially dissatisfied) in both cases, either with or without price limits.

To the contrary, providers of health care feel a direct personal impact from what happens on health care market: Their individual utility is straight affected by the part of the dead weight loss that newly falls upon them. So, they start to complain and they are probably able to be loud enough to be heard.

To an individual observer, the situation with price limits thus seems as less satisfying concerning different agents on health care market. It is however a question, whether a society would classify this situation to be more 'fair' in terms of social welfare dead weight loss distribution between market agents, or whether it values more a situation with less individual complaints[60]. It is therefore only up to a given society and its preferences (or better up to its political representation), what settings, whether with or without price limits, will choose. Such problem is however again an issue of Public Choice, hence out of scope of this thesis.

In some real health care sectors, one may argue, we do not, however, observe any such important increase in health care providers' dissatisfaction after price limits were put in effect by insurance funds. In the model of effective health care demand, such situation can also occur. However, it can only happen if the threshold price P^{max} is set almost exactly equal (or above) to the market-clearing price P_E of a situation without any demand inducement. Then, the price limits would in fact constitute an incentive for health care providers to lessen

[60] Once more, remind that the problem is that individual consumers are not able to adjust their behavior according to some social budget constraint: for each individual, such constraint appears to be soft, although it is a hard constraint for a society as a whole.

their influence on health care consumers in terms of the quantity of health care that consumers are convinced they need to consume to be saturated. As a consequence, the effective demand curve would then move to the left such that the price P^{max} would become a new equilibrium price corresponding to the decreased quantity of consumed health care $\overline{HC}'$. As a result, providers of health care would divest themselves of their share of dead weight loss and, furthermore, the total dead weight loss would decrease, so consumers would finally be also better off.

Such an outcome is definitely the best one could get out of any price regulation. However, as in case of any regulator, there is an asymmetry of information between insurance funds, who set the price limits, and the health care providers, who are influenced by it. As insurance funds can be never sure how big actually the effect of supplier-induced demand is, they never know exactly what price should be set as a threshold. Hence, the only way for them is to somehow target the limiting price and adjust it in time according to the development of different market agents' reaction[61].

The price regulation can nevertheless explain the situation in many European countries with publicly funded health care insurance systems and free access, even though it may be limited by moderate user charges, to health care. In those countries the explanation of some part of social welfare dead weight loss that is acquired by health care providers can better explain a state of contentment of people, as well as health service providers, with the overall system. This fact can be regarded as another prove that the model of effective demand for health care can be well used to describe state of art of European health care systems.

3.2 Quantity limits

Another regulating restriction that insurance funds can use in their role of health care system administrators and financial managers is quantity limits. By setting a maximal quantity of health care for which providers will be reimbursed, insurance funds try to decrease overall health care expenditures. In general, there are two possible ways how a health care

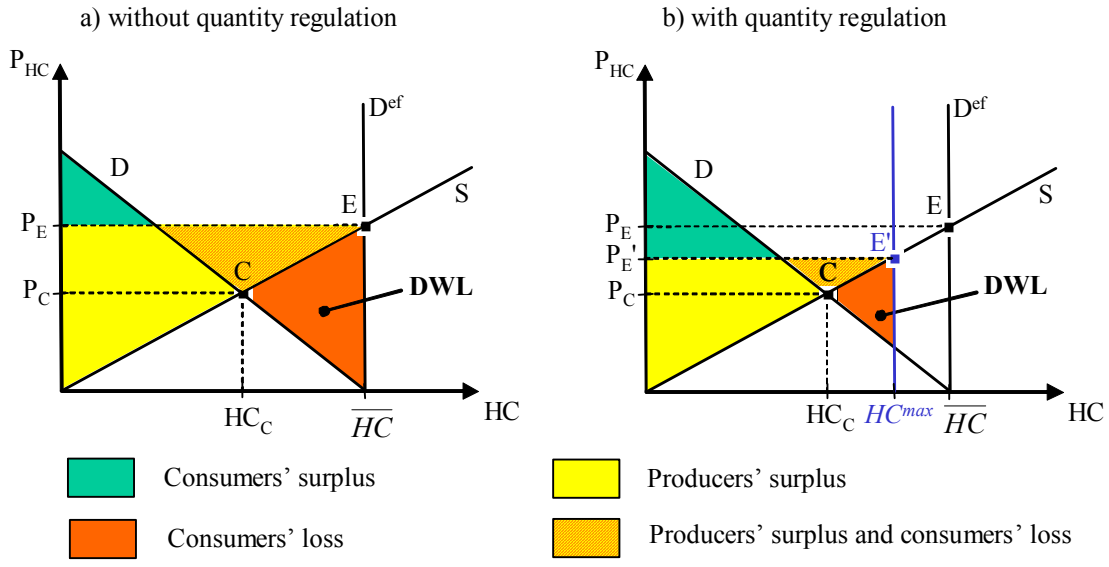
[61] Nevertheless, such process is probably hard to use, as providers would be always complaining about price limit when introduced, since lower demand-inducement means also a lower surplus for them. The adjustment of the effective demand as a result of reduced inducement will not take place in short-run, but rather it will appear in medium to long-run.

market with publicly funded insurance can develop after introduction of such measure. The resulting state of art will depend not only on the sequence of events within which the regulation is put in effect, but also on the market organization of health care providers.

3.2.1 Quantity regulation in competitive market structure environment

Assume that at the beginning people are consuming an amount of health care $\overline{HC}$ for price P_E, which is given by the point of intersection of the effective demand curve D^{ef} and the health care supply curve S. Further suppose that providers of health care face an important competition between each other and that the entrance to health care provision sector is not significantly limited. Then we can expect that introduction of some upper limits on reimbursed health care quantity by insurance funds will lead to a situation that is illustrated at Picture 3.2.

Picture 3.2: Health care market welfare diagram with quantity regulation – competitive market structure



Setting up a limit on health care reimbursement by insurance funds has for health care providers the same effect as if effective demand has diminished. In fact, it seems to them that the demand really *did* diminish. Since providers compete between each other, none of them is able to provide health services for a price that is significantly higher than price at the rest of the market. If one of them would keep charging the original price P_E (or generally any

price above P_E'), there would be always someone else who would take over his market share by offering a lower price (remind that we assume that the entrance to health care sector provision is free, i.e. a new provider can enter without major difficulties).

Therefore, a new market equilibrium would come about in point P_E' shown in part b) of Picture 3.2. Compared to the original situation, the market surplus of providers (the yellow and the yellow-shaded area) decreases, nevertheless none of them would be complaining about the new state of art, because they do not acquire any dead weight loss from this setting and because the resulting price of health care is an outcome of pure market forces.

Concerning the surplus of consumers in the new setting, according to the green and the red (and the red-shaded) area at the picture, the size of loss reduces, whereas size of surplus enlarges. Hence, consumers are in general better off. From this follows that the overall size of the dead weight loss diminishes, so we can say that the total social welfare increases.

Now, based on these conclusions we could be fully satisfied with such an outcome of quantity regulation. However, there is one more thing to mention, which makes the result not as welfare-straightforward. Note that the health care, which is provided and consumed under the new circumstances, is of quantity $\overline{HC}'$, which is significantly smaller than quantity $\overline{HC}$. But the quantity $\overline{HC}$ is a sum of individual subjectively desired quantities of health care for a zero price. So, since for an individual consumer nothing has changed in his personal point of view that any additional unit of health care he decides to consume is actually for free for him, each individual will continue to demand quantity of health care $\overline{HC}_i$, which makes a sum over all *i* equal to the quantity $\overline{HC}$. And here we get the contradiction: For providers it seems as if the effective demand was $\overline{HC}'$, so they provide such quantity of services, but consumers require a higher quantity $\overline{HC}$. The outcome is clear. In the matter of financing, the two decisive groups of market agents are providers and insurance funds, so the final quantity of health care offered would be $\overline{HC}'$ and consumers would be left individually dissatisfied (and complaining).

Unless consumers complain about such state of things loud enough and they have a sufficient influence on decisions of insurance funds (depending on insurance organization, its supervision and corresponding consumers' representation in decisive bodies), they will be left individually discontent, though in total a society is definitely better-off.

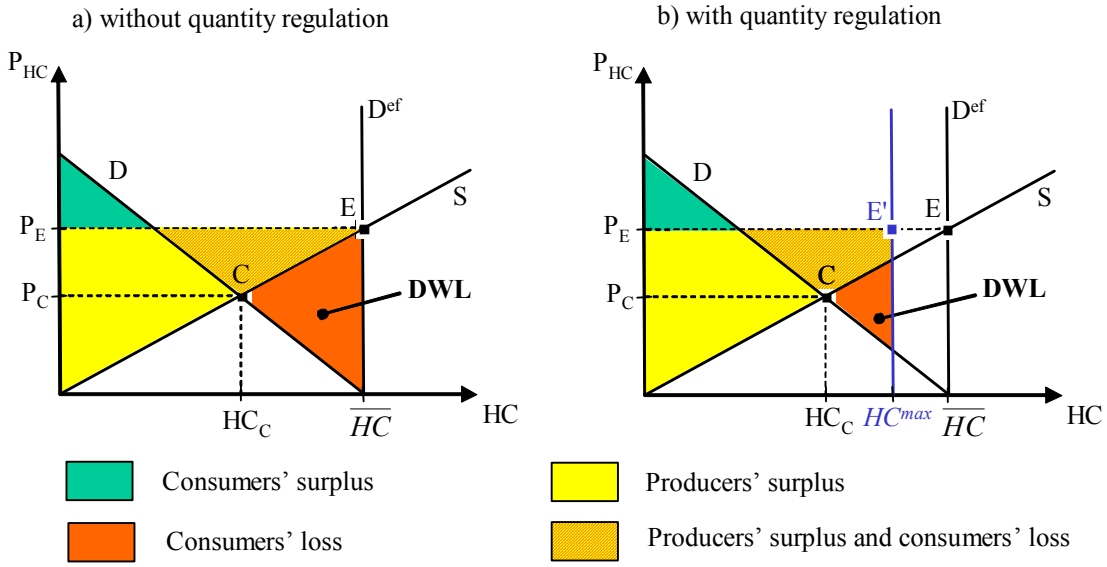
3.2.2 Quantity regulation in a noncompetitive market structure environment

Another case occurs if entry to health care market provision is not that much free, but rather it is somehow restricted, which is probably a more realistic case than the perfect competition in above paragraphs. With health care, licenses are required not only for individual physicians, but for any medical facility. Moreover, for necessary and urgent care medical facilities constitute usually a geographical monopoly. A slight exception is big cities where there are usually several different hospitals and clinics nearby, nevertheless in such case medical facilities organization is still far from being truly competitive, rather they together represent an oligopoly, as is also the case of other than urgent care in medical facilities out of big cities.

In case market structure of health care providers is not competitive (due to any of above mentioned reasons), we cannot expect, in opposition to the case of previous section 3.2.1, that after insurance funds introduce a health care quantity regulation, it will appear to providers as shift of the effective health care demand curve. Rather, their behavior will depend on an overall regulating setting that insurance funds introduce together with quantity limits.

The insurance funds do not know how actually a supply curve of health care providers looks like. Due to asymmetry of information between insurance funds and providers, providers can pretend to have a higher price elasticity of their supply than they would in fact have if they were forced to reveal their proper supply curve on a competitive market. In an extreme case, they can pretend to have an infinitely price elastic supply curve. The level to which providers are able to pretend a more elastic supply curve will strongly depend on their ability to enter into a collusion with others and on the ability of all parties to let such collusion last.

Picture 3.3: Health care market welfare diagram with quantity regulation – oligopoly market structure



Picture 3.3 shows a market development in such an extreme case, where insurance funds don't introduce any other (for instance price) regulation besides limits on quantity reimbursement and health care providers are strong enough to cooperate and keep the unit price unchanged. In such case, providers are able to capture in their surplus not only a part of consumers' surplus, which would under a competitive market structure belong to consumers of health care, but also a part of consumers' welfare loss, which would in a competitive environment under the same circumstances disappear.

Likewise the competitive environment, we can see that quantity reimbursement limits lower the total welfare dead weight loss that a society acquires. Nevertheless, even in this setting the issue of dissatisfied individual health care consumers remains actual. Again, people are theoretically granted any health care of any individual quantity free of charge, but in practice they never get it in such a scope that would fully saturate them.

Hence, it is once more only a question of social preferences, or better a question of preferences of political representatives and power of different lobbies, whether and how a society will introduce limits on health care quantity coverage from publicly funded health care insurance. The decision for this sort of measures will definitely lower the overall welfare dead weight loss, nevertheless some societies may value more a 'fair' distribution of market surplus between providers of health care and its consumers, which may not be in accord with

the outcome of quantity limits in the environment of non-competitive providers' market structure.

3.3 Role of insurance funds in health care systems

In any developed health care system, and particularly in those of European countries, a very important role is entrusted to health care insurance funds, or to some other institution, in general can be called also a "fund", which has the same function on a national level in systems other than plural of publicly funded health care insurance (for instance the UK – National Health Service).

Insurance funds in this more generalized sense serve as health care systems administrators and managers. In different systems they fulfill this role up to a different degree, depending on the overall health care sector organization and regulation. The intent is never to give them a full control over the sector, but to take an advantage of their ability to control and limit potential overprovision and overutilization of health care that threaten any system with publicly funded insurance, and, moreover, to exploit their potential to increase efficiency of the system as a whole. In systems where there is only one financial authority, it usually fulfills the administrative role and the managerial role per se as a central planner. On the other hand, in plural health care insurance systems, the idea is based on principle of subsidiarity. While a central planner always suffers from lots of imperfections (is too far from sector's real problem, has only limited information, cannot know what is 'good' for consumers, creates a nontransparent decision-making environment, etc.), and thus can never take a 'perfect' action, a plural system of insurance funds is 'closer' to what really happens and, moreover, can make the funds to face a competition between each other and then to transmit this competition also on providers.

Creating a competitive environment on the insurance market is the principal objective of any plural health care insurance system. It would be useless to ever permit more than one insurance fund to operate on health care market if we don't trust market forces and the power of competition in reaching optimal market equilibrium. Further, it would be even more costly, since plural systems demonstrate significantly higher administrative costs than only one national institution. However, the potential to increase efficiency of health care

system together with rationalized health care consumption promise to outweigh the growth of administrative costs.

Consumers individually don't have such a power to have an equal position as health care providers in a health care market contract. Furthermore, as we have already argued, they have only an imperfect information and knowledge concerning their proper health status and available medical treatment and devices. Therefore, they tend to delegate authority to health care providers to actually decide on behalf of them what kind and how much of health care they need (see induced demand phenomenon in section 2.3.4 earlier).

In such a situation, health care insurance funds should act as advocates of their clients (that is of all their policyholders, not only of patients-present consumers of health care) in a market contract. It is them who should supervise the behavior of health care providers as to avoid overprovision of health care at the implicit cost of consumers. It is however also them who should introduce a set of incentives to ration health care consumption and reduce the extent of consumers' moral hazard, which are both problems of any publicly funded health care insurance system.

So far we have talked about some kinds of regulation that insurance funds can use both on the side of providers and on the side of their clients. Nevertheless, we have not yet dealt with their role as consumers' (or better taxpayers') advocates and associated health care price negotiation. Nor have we talked about their role in strengthening providers' competition.

3.3.1 Competitive health care insurance funds and system's efficiency

As we said earlier, it is more realistic to think about health care providers' market structure as of an oligopoly (or for some care geographically monopolistic) one with limited entrance, than a competitive one that approaches perfect competition. Hence, individual providers, depending on their size, have some possibility to exploit their market power and gain some part of a monopoly profit. The less there is a competition between them, the bigger is their ability to behave in this manner.

In this final section we are going to elaborate on the issue of insurance system's structure and its consequent efficiency impacts on the whole health care sector. We are going to see that this issue can be also incorporated into the model of effective demand for health care.

It is quite clear that if there is only one national authority who serves as financial intermediate of health care system, it can introduce only some administrative measures as price or quantity regulation to guide the behavior of health care providers. Moreover, in this setting providers lack any real incentives to compete among themselves in terms of price and quality, because there is only one actual purchaser: the mentioned national authority.

On the other hand, if there are more insurance funds, their existence is conditional on number of policyholders they have. In a publicly funded health care insurance system, insurance funds cannot compete for their clients on the basis of 'price', i.e. of the size of individual insurance contribution, because this is given centrally. But they can compete on the basis of the quality of their services, and in systems where there exists a defined health care package covered from public insurance, they can also compete in terms of scope of "above-the-package" health care that they manage to cover for their policyholders from compulsory insurance premiums (i.e. free of extra charge). The quality of services provided by insurance funds for their clients concerns scope, quality, and accessibility of health care that they purchase and offer to their policyholders. In addition, people choose from insurance funds' offers based on the level of these three parameters and their individual preferences.

This is the kind of competition among insurance funds, the competition for clients on the basis of offered services, which is desirable. Sometimes we can hear to speak about insurance funds competition as about an undesirable thing. In that case, it is usually meant a competition of insurance funds in terms of insured population, i.e. a risk selection: Insurance funds try to attract the best risks and to avert bad risks in order to have low expenditures per capita. Such competition is truly not desirable, as it leads to a market failure called adverse selection. However, it needs to be noted that adverse selection is not present on a competitive health care market without insurance, from which we have proceeded in the first part of this thesis. To the contrary, adverse selection is a market failure of an insurance system's own. Nevertheless, this failure can be quite easily avoided in the system by well defined insurance contribution redistribution and risk sharing across the whole population pool (and not only across individual insurance funds' pools).

So, while competing for clients, insurance funds in the role of health care purchasers require health care providers to offer good quality care for a reasonable price. Compared to a one-purchaser system, in true plural system insurance funds can actually choose between health care providers (under the condition that there is not a chronic shortage of these). So,

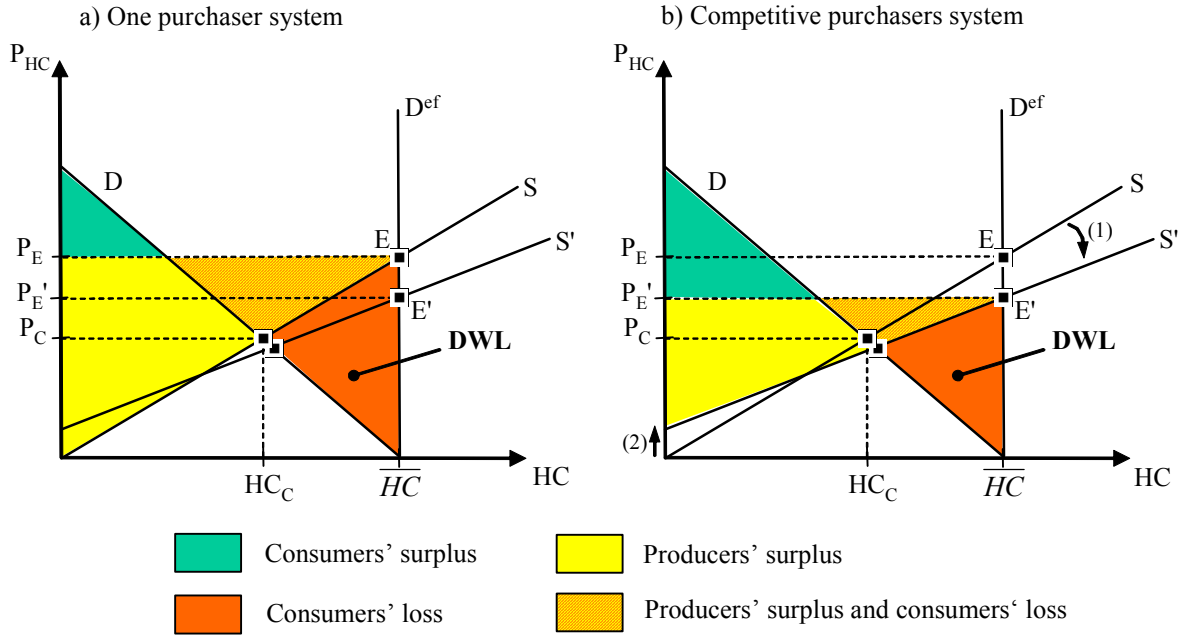
insurance funds create an active demand and represent equal partners for providers' professional associations in the matter of health care purchasing.

In such a setting, competition on health care insurance market is carried over to providers: Health care providers need to increase efficiency of their work and quality of their services in order to become (and remain) competitive. If one of them falls behind others, an insurance fund can choose not to purchase, on behalf of its policyholders, health care from him, and hence the provider can loose an important share of his clientele.

In return, in case of preferred organizations providers (PPP) or managed care organizations (HMO)[62], a purchaser can offer (and guarantee) to a provider a sufficient number of patients if they make a contract on certain quantity of health care for a certain (good) price. By having such contract with an insurance fund, a health care provider can for instance achieve some savings in administrative expenses of his office per patient. The most important is however the fact that the provider has now some degree of certitude on volume of his future patients. This gives him even a higher incentive to yet improve quality of his services and lower the price in order to keep the contract.

[62] In such organization of health care, consumers of health care are motivated to select their physician or medical facility out of a restricted list of providers. The motivation can be done either by bonuses or by extra charges in case a person chooses out of the given list.

Picture 3.4: Insurance funds increase efficiency of health care sector and lower dead weight loss



On Picture 3.4 there is an illustration how a health care market can develop after introduction of plural system of health care insurance, with competitive insurance funds, compared to a situation with only one central insurance authority. The situation is for illustrative purposes schematically outlined in a welfare diagram that we have used earlier when demonstrating different restricting measures (i.e. the baseline situation is the one of publicly funded insurance providing first-dollar coverage).

In this special case shown at the picture we use the assumption that in a system of several insurance funds that are allowed to selectively contract health care, the funds' competition for policyholders on the basis of quality of services offered (including the scope, quality, and accessibility of contracted health care) will produce a pressure on health care providers (under the condition that there is not a chronic shortage of these) that will in turn result in increased competition also on this market segment, i.e. among providers. Moreover, allowing for managed care type of companies, purchasing health care in higher volumes would with a high probability decrease variable costs of medical providers per patient. All of

these facts would lead to a clockwise turn of the aggregate health care supply curve compared to the situation of only one national health care purchaser[63].

So far we have assumed an upward-sloping supply curve. There is no need to suppose that the new supply curve will not be an upward-sloping anymore. Nevertheless, introduction of competitive insurance market will lead to an increased price-elasticity of health care supply.

Besides increased efficiency through strengthen competition of the health care system as a whole, plural system of insurance companies has also one financial disadvantage compared to a system with only one national insurance company. It concerns the administrative costs of the system, which are higher with increasing number of insurance funds presented on the market. These administrative expenses constitute an extra fix costs for the health care system. On Picture 3.4 this is illustrated as a parallel shift of the supply curve up.

Though we have originally drawn in the welfare diagram the supply curve as beginning in the origin (i.e. based on the assumption of no fix costs), we have not devoted enough time in this thesis to examine in detail the supply side of a health care market, and thus the welfare diagram's supply curve served only for illustrative purposes. Nevertheless, it is not important in this moment where exactly the supply curve begins in the price-quantity space, since the issue is a comparative static analysis of the state of art before and after introduction of competitive health care insurance funds system.

Hence, we can sum up the two effects that occur within a health care market as a consequence of introducing a competitive plural system of health care insurance funds. The first effect increases efficiency of health care provision, as competition of health care funds based on selective contracting forces providers to compete as well. The consequence is the turn of the health care supply curve to the right around the point of intersection of the supply curve with the price axis (arrow marked No 1 at Picture 3.4), which results in lower market equilibrium price level and therefore also lower social welfare dead weight loss. Furthermore, the direct surplus of consumers (green area at the picture) increases.

[63] According to European Commission (2004), p. 23, "giving purchasers of health care responsibility for cost control and quality and accessibility of health care, and strengthening their 'agency' role, should lead to a more efficient use of resources".

The second effect increases fix costs of the whole heath care system due to increased administrative expenses, which results in parallel shift of the supply curve up (arrow marked No 2 at Picture 3.4), which brings the new market equilibrium price closer to its original level and compared to the first effect it thus increases the welfare dead weight loss.

The two effects have just opposite impacts on social welfare in terms of the dead weight loss. As we said, it is presumed that the effect of improved efficiency is significantly higher than the effect of raised administrative costs, and so that improving health care funds competition via giving them responsibility for cost control and quality and accessibility of health care and at the same time allowing them to selectively contract brings extra utility for a society as a whole. Such conclusion is also supported by recent development in some EU countries, where reforms of this type undertaken by countries with originally integrated health care systems are in general viewed as successful (European Commission, 2004). The model of effective demand thus once more proved to be able to capture within its framework simplified relationships and consequent outcomes of a publicly funded health care system.

Conclusion

Though having the word demand in its title, the thesis treats issues of health care systems in general, and especially the issue of health care markets with publicly financed mandatory health care insurance system that we can find generally in all EU countries, and their welfare implications.

For description of European markets for health care, the thesis proposes a model of effective demand for health care, which is based on microeconomic analysis of individuals' behavior concerning health care consumption. The concept of the model stands on the assumption of existence of effective demand for health care that is, under an insurance system with first-dollar coverage, price inelastic. Within this model the main hypothesis of this work is supported that publicly financed health care systems create an important social welfare loss.

This welfare loss is illustrated as a loss of consumers' surplus not offset by providers' profit, which, under the condition that there is a sufficient money in the system to cover the full quantity of health care demanded by consumers for corresponding price required by providers, goes fully at the expense of consumers of health care. More generally speaking, it goes at the expense of clients of a health care insurance system, as in publicly funded systems those who pay the highest contributions don't have to be necessary also those who consume the highest quantity of health care.

The important thing about this welfare loss is the fact that the core of it is not caused by any imperfect market structures in terms of health care providers (since in the basic version of the model we have assumed a hypothetically competitive market), nor is it caused fully only by consumers' moral hazard (as is the usual explanation of some neoclassical economists, see for instance Donaldson and Gerard, 1993, or Hurley, 2000, or Stiglitz, 1997). Instead, the explanation lies in rational behavior of health care consumers who maximize their private utility under a third-party payer setting. Hence, a publicly funded health care insurance system can solve some market failures typical of health care markets, but at the same time it causes a health care market to be inefficient in terms of a non-competitive 'market-clearing' price.

The thesis also succeeded to demonstrate that, based on the model of effective demand, by abandoning a system of publicly funded health care insurance with first-dollar coverage and setting a moderate consumers' direct payments (either fixed or proportional to

the real health care price) as a complement to public insurance, the social welfare loss can be significantly diminished (this theoretical outcome is also supported by empirical evidence). Furthermore, this conclusion holds even when controlling for existence of 'safety' externality and the social solidarity notion, or 'caring' externality, because, according to the definition of social welfare function developed in this thesis to assess health care issues, the marginal change in agents' surplus loss acquired form health care market setting with publicly funded health care insurance providing first-dollar coverage has positive effect on social welfare and is still bigger than the marginal loss of positive contribution to social welfare from the other two social welfare function's variables.

Next, by extending the model of effective demand to the intent to actually distinguish between providers of health care and health care payers (purchasers), the model proves to be able to express to a considerable degree within its simple theoretical framework the essence of European health care systems. Besides demonstrating that within its framework we can assess effects of some exogenous factors on health care market outcome, allowing for some administrative measures by purchasers with respect to the supply of health care can reasonably explain the overall situation in EU health care sectors concerning also an individual satisfaction with the outcomes. The model also theoretically justifies recent reforms of some European countries aiming to introduce a higher competition between its system's insurance companies. It argues that by improving competition between purchasers of health care, there will be a positive spillover effect on competition between health care providers and such development is very probable to lead to an increased efficiency of the overall health care system.

However, what the thesis has not spoken enough about and what thus remains for further research is the health care providers' group of agent and their behavior within the model of effective demand. Their market structures, behavior, and incentives towards other system's agents deserve yet more attention. Also, some other health care market situations are also worth further considerations as well as loosening of some assumptions. For example, an interesting case may be to explore a situation where the health care supply curve never intersects the effective demand curve and it converges to it only for an infinite price (for instance due to objective technology constraints and/or high consumers' expectations). By definition, there can't be sufficient money in the system to cover the full extent of effective demand for required price. This would in turn lead to individual consumers' dissatisfaction or

to complains of health care providers, since such a double bind could be resolved probably only by some administrative measures introduction (price or quantity limits), so either the first ones would not get fully what they individually want, or the second ones would acquire a welfare loss (loss of profit), or some combination of the two would occur.

Such reflections go however beyond the scope of the simple version of the effective health care demand model limited by the extent of this thesis and thus are left for future research.

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