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Implementing Risk Adjusted Capitation Payments with Health Care Reforms in Hungary

Since the late nineties Hungarian governments have been considering the introduction of new health care arrangements by establishing organizations with devolved responsibilities for the management of health care. These organizations are typically financed through a weighted (risk adjusted) capitation system which is regarded as an adequate and optimal tool for resource allocation purposes. Through capitation one needs to handle large inequities in the Hungarian health care system and keep an eye on the incentives for efficiency. For the capitation formula a relatively broad choice of risk adjusters are available in the form of pharmacy- and diagnosis-based patient level utilization data (health-based adjusters) and area level socio-economic data (non health-based adjusters). The instant application of health-based adjusters has limitations because they reflect a distorted provider structure and offer perverse incentives; therefore a gradual shift from using non health-based adjusters to health-based adjusters is preferred. The early phase of the capitation system also implies a strong presence of risk sharing arrangements and other complementary policies. Given that promoting efficiency and equity are to be pursued, the capitation approach outlined in this paper should serve as a guide to future Hungarian health care system reforms.
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Introduction

Many efforts to reform health funding and the delivery of health care arise from concerns about cost escalation, which is a well-known policy concern in the majority of developed countries (*Segal et al 2002*, *Rice and Smith 2001*).A common element in these health care reforms is the application of prospective payments, because this method allows the application of rigorous budget constraints. Prospective budgets allocated to health care organizations with devolved responsibilities are often set by capitation formula (*Milgrom*

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and Roberts 1990, *Rice and Smith 2002*). Capitation can be defined as the amount of health service funds to be assigned to a person with certain characteristics for the service in question, for the time period in question, subject to any budget constraints (*Smith 1999*). In effect, a capitation puts a "price" on the head of every citizen, which represents (in an ideal world) an unbiased estimate of the expected costs of the citizen. The crucial element of capitation payments is the calculation of expected expenditures depending on individuals' personal characteristics; a process often referred to as risk adjustment. This method has been the focus of several studies over the last 15 years[1]. However the success of capitation depends not only on the integrity of risk adjustment methods but also on the context in which the formula is applied (*Peacock and Segal 2000*). Thus both the methodological and policy concerns of the capitation technique should be considered.

In the last 15 years Hungary has shown a considerable interest in prospective budget setting in health care and applied it as an important policy instrument for cost containment. Prospective financing techniques were introduced in the nineties to various health care services, including in-patient care, ambulatory care and diagnostic services. Simple capitation approaches with little scientific emphasis have also been applied for the remuneration of primary care physicians and managed care pilot organizations. Health care reforms in the last decade, while leaving most of the provider financing methods untouched, direct attention towards the application of the capitation approach in order to promote a nationwide strategic resource allocation. This paper examines the challenges and difficulties Hungary has to encounter when setting capitation budgets for financially responsible devolved health care organizations and demonstrates the possibilities and opportunities a country has to deal with, in order to secure important resource allocation goals, such as equity and efficiency. The question addressed here is, given the Hungarian health care environment, the declared resource allocation goals and the instruments available, what capitation methodology best serves our purposes? To answer this we first discuss the basic characteristics of the Hungarian health care system and the reforms that have been considered for implementation; then we move towards the application of risk adjustment in this system and the complementary policies to be set along with capitation before finally examining the criteria of application and drawing conclusions.

System Characteristics

Current Health Care Funding and Delivery

The health care system in Hungary is funded through a national health insurance scheme that requires mandatory participation and provides universal coverage for every citizen. Health care is principally funded through taxes and income related health care contributions that cover 70.9 % of total health care expenditures, while 29.1% is paid out of pocket or from other sources (*OECD 2008*). Services are delivered predominantly by local government owned public providers who contract with the single nationwide insurance institution (National Health Insurance Fund Administration, NHIFA). Local governments are responsible for

[1] *E.g. see special issues of Health Care Management Science, Medical Care, Health Policy, Health Care Financing Review, Inquiry, and reviews by Van de Ven W and Ellis R (2000) and Rice and Smith (2001)*

ensuring health care coverage – municipalities are responsible for primary care (e.g. family practitioners), while county governments are responsible for secondary health care services (e.g. hospitals). Health care providers are directly financed by NHIFA through 20 centrally defined sub-budgets, largely with performance based payment mechanisms (i.e. diagnosis-related groups; point-for-service system). The ownership of health care providers is mostly under public control with the exception of family practices, pharmacies, kidney dialysis and some diagnostic services. In sum, the funding, organizing and providing of health care is more or less dominated by the public sector with a slowly increasing role of private and not-for-profit participants.

Health Care Reforms and Devolved Organizations

Several reforms have been introduced to improve the Hungarian health care system since the early 1990s. Achievements so far have been mixed, and there has long been agreement that further improvement is required. Since 1998 health care reforms have been attempting to enhance the *efficiency* of the system by the introduction of devolved organizations that arrange health care services for the population in their jurisdiction. These efforts comprise (i) the establishment of managed care organizations inspired by the British fundholding and the US HMO[2] systems (*Mihályi 2003b*, *Nagy and Dózsa 2002*), (ii) the introduction and the rejection of a competition based health care co-ordinating model built upon sickness funds with private involvement (between February 2008 and May 2008) (*Nagy et al 2008*, *Magyar Közlöny 2008*, *EÜM 2007*)and (iii) various proposals for setting up geographically defined, non-competing, publicly owned health care delivery schemes (*EÜM 2004*, *Sinkó 2008*). A common element of these arrangements has been to devolve responsibility for organizing health care to purchasers (often referred as health plans) that promote the efficient delivery of health care. At the same time, the principle of *solidarity* (equity) has remained a prime goal of the Hungarian health care system and this has been constantly supported by the strong presence of public funding and delivery.

Funding Arrangements

An important characteristic of the proposed health care arrangements is that the devolved organizations are financed through a weighted capitation system. Figure 1 shows the typical flow of payments in the proposed health care arrangements. Health plans are financed by NHIFA through capitation while the – direct or indirect – financing of the providers is taken over by the devolved organizations. The capitation payment covers the majority of the publicly financed in-kind benefits, including e.g. primary care, outpatient specialist care, dialysis, computer tomography (CT), magnetic resonance and imaging (MRI), home care, inpatient services and medicine subsidies. Health care services that are not covered by the capitation scheme (e.g. catastrophic interventions, experimental treatments, implants, pharmaceuticals distributed under special rationing) typically remain financed by NHIFA and reimbursed from a national risk pooling fund (see Figure 1). In all schemes the dominance of capitation financing has been essential: for example in the latest known –

[2] *HMO: Health Maintenance Organization, the most prevalent type of managed care organization that provides a form of health care coverage through contracted hospitals, doctors, and other providers in the United States.*

February 2008 – reform proposals, 91 % of in-kind benefits were planned to be financed by capitation (Table 1). This indicates a crucial role for this type of financing method in cases where the Hungarian government considers health care arrangements for devolved organizations.

It is important to note, however, that while there are many other areas of application for the capitation method (e.g. reimbursement of providers, allocation of capital resources) this paper focuses on setting capitation by NHIFA (sponsor) for devolved organizations (health plans) (see Figure 1). This process is often referred to as strategic resource allocation (*Rice and Smith 2002*) and its implementation is regarded as one of the most prominent issues of health care planning in the majority of developed countries.

Figure 1

The typical flow of payments in health care schemes for devolved organizations, proposed by recent Hungarian health care reforms

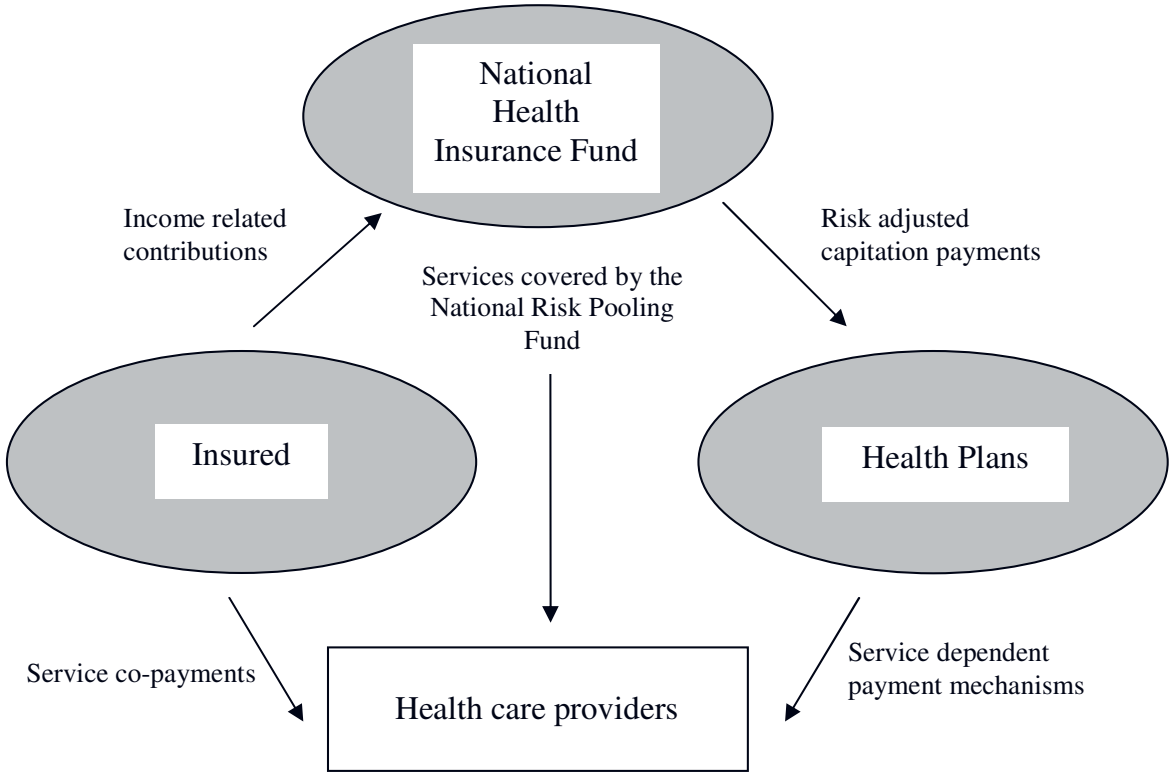


Table 1

Main categories of Health Insurance Fund expenditures projected in 2007, split according to the February 2008 reform proposals

In-kind benefits covered by the capitation scheme		
Curative and preventive services	Total current expenditures (billion EUR)	Per capita expenditures (EUR)
Family doctor services	244	24,0
Dental care	79	7,8
Chronic care	38	3,7
Patient transfer	25	2,5
Kidney dialysis	82	8,1
Home care	15	1,4
Laboratory diagnostics	78	7,7
Outpatient specialist care	362	35,6
CT, MRI	49	4,8
Inpatient services	1 544	151,7
Balneotherapy	23	2,3
Medicines subsidy	1 435	140,9
Medical aids subsidy	139	13,7
Total benefits covered by the capitation scheme	***4 113***	***404,0***
In-kind benefits *not* covered by the capitation scheme		
Mother and child health services	77	7,6
Ad hoc medicine subsidy	17	1,6
Transport subsidy	28	2,7
Emergency care units	75	7,4
Treatments under special rationing regimes, implants	76	7,4
Other in-kind benefits	116	11,4
Total benefits not covered by the capitation scheme	***389***	***38,2***
Cash benefits	900	3,6
Administration	1 236	4,9
Total public health care expenditures	***6 636***	***26,4***

Note: 1 Euro = 250.93 HUF

Source: National Health Insurance Fund Administration, 2007, Nagy et al 2007, Magyar Közlöny 2008

Relevance of Capitation

Capitation payment should address both the goal of a more efficient and a more equitable resource allocation in Hungary. These goals will be considered in turn.

Efficiency of Resource Allocation and Risk Selection

One motive behind implementing capitation is to secure control of expenditures which is a macroeconomic efficiency concern. Strict budget constraints imposed by the capitation method strongly support the cost containment efforts and the rigorous budget planning process that have been exercised in the last two decades by respective Hungarian governments. Secondly, the efficient allocation across various health care provisions can also be supported by the capitation method. In the Hungarian system providers are financed directly by the NHIFA through a system of isolated sub-funds. In contrast, under the capitation scheme money flows are no longer earmarked; health care organizations have the choice to develop an optimal blend of services for their population and allocate resources accordingly.

Further efficiency objectives are also implicit in the sense that capitation seeks to make purchasers and providers more responsive to issues of the costs and benefits of their actions. This, on the one hand encourages health plans to operate efficiently; on the other it increases non intended risk selection behaviour. Risk selection usually becomes a problem when health plans are not compensated for their high risk/high cost enrolees. When capitation based budgets are not accurate (or generous) enough to cover current expenditures, health plans will attempt to "cherry-pick" the less costly population (if they have the chance) or promote other non intended behaviours (e.g. quality skimping, underproviding). These activities certainly undermine the efficiency of the health care market, and it is desirable they should be prevented through adjusting for the predictable expenditures of the population in the capitation scheme (*van den Ven and Ellis 2000*). In that respect an accurate capitation formula has a role in ensuring the flawless *operation of the health care market* through reducing incentives to risk selection.

Equity of Resource Allocation

The application of capitation payment to the proposed health care delivery schemes has another strategic role in Hungary. Securing equity, defined as providing *equal access to health care according to equal needs,*[3] has been declared a cornerstone of Hungarian health care reforms for many decades. There has always been a high priority attached to this notion; however its operationalisation has not been very successful. The population's needs across different regions is not particularly reflected in the health care provider structure: in certain areas people have better access to health care than in other areas. This difference is particularly apparent between rural and urban areas (*Orosz 2001*, *Mihályi 2003a*, *Goglio 2005*), and as a result the allocation of health care resources is regarded as inequitable in many aspects in Hungary (*Takács et al 2006*, *Boncz et al 2006*, *Szaszkó et al 2006*). Even if the observed differences relate not only to health status, but to social, economic, demographic, housing, educational and other circumstances, they can to some extent be addressed by

[3] *This definition of equity is often referred to as horizontal equity in the health economic literature.*

the development of the health care delivery system. Therefore it is imperative to adjust for these existing inequalities when designing a resource allocation scheme. In order to put this into effect appropriate measures of health need to be incorporated in the capitation payment formula that are independent of current provision and are capable of reflecting the population's different levels of health care need. Nevertheless it is important to bear in mind that a well designed capitation formula in itself cannot solve all problems of inequality within the Hungarian health system.

Role of Risk Adjustment

As explained above, both the promotion of equity and efficiency have to be considered in the design of the capitation formula. There is a wide consensus in the health economic literature that the best way to account for both goals is the risk adjustment method (*Rice and Smith 2001*, *van den Ven and Ellis 2000*, *Newhouse 1998*). We define risk adjustment as the use of information to calculate the expected health expenditures of individuals over a fixed interval of time and to set capitation payments to health plans in order to improve efficiency and equity. We discuss the applicability of risk adjusters in Hungary under two broad categories: (a) health-based adjusters and (b) non health-based adjusters; within non health-based adjusters we discuss demographic adjusters (age and gender) separately.

Risk Adjustment Methods

Age and Gender Based Risk Adjustment

Demographic information for risk adjustment is usually accessible, valid and verifiable in many countries. Capitation models that incorporate information on age and gender are used in the majority of the risk adjustment models (*Rice and Smith 2001*), although demographic models have weak power to predict future costs and their capability of reflecting health care needs or future health care consumption is very limited (*van den Ven and Ellis 2000*). In spite of their poor statistical performance they still prove a legitimate reflection of health care needs on condition that their effect on resource allocation has been thoroughly scrutinized before application.

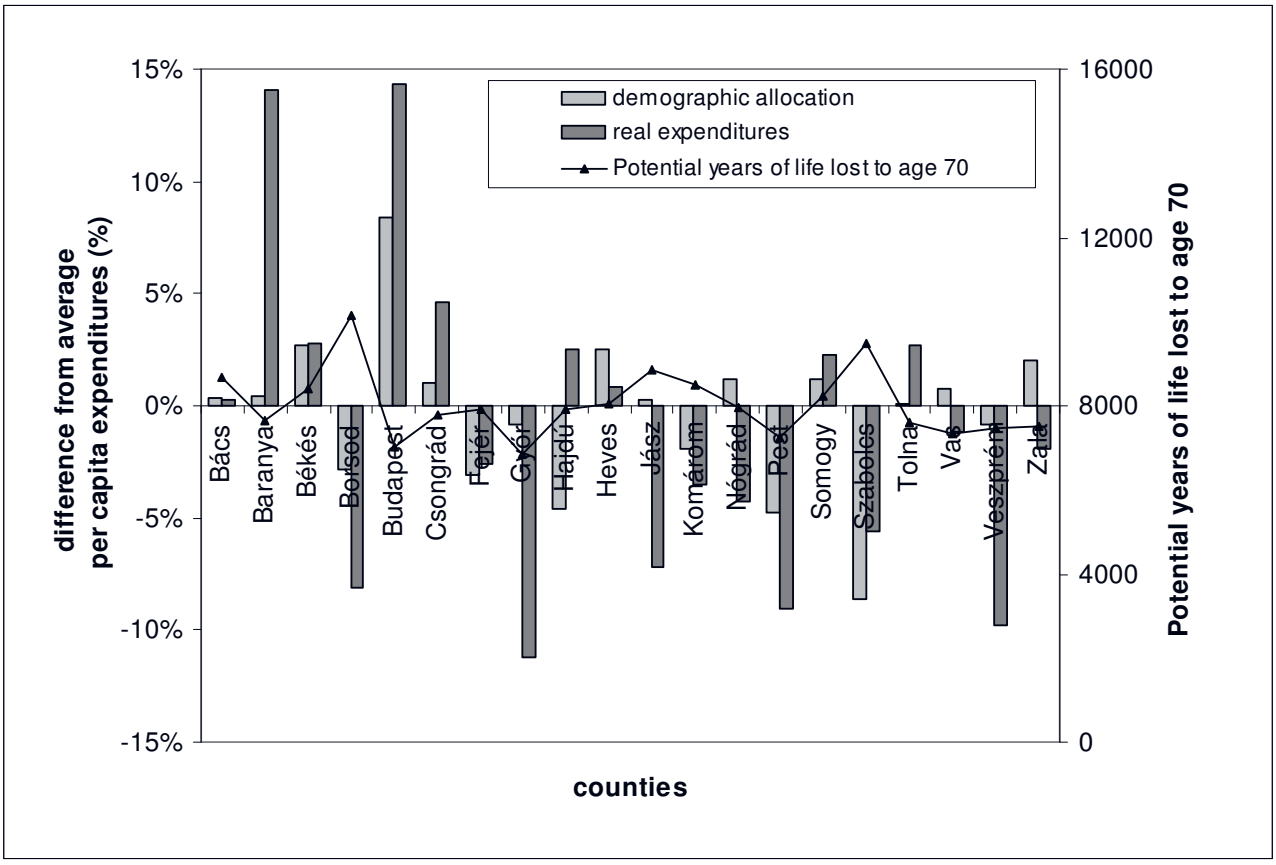
A recent analysis of the application of the demographic formula in Hungary showed similarities with international experience: the age and gender based model explains only a small percentage of the variance of health care expenditures (R^2=0.0457 (*Nagy et al 2003*)). It has also been suggested that the demographic formula results in a serious reallocation of resources across regions (*Nagy et al 2007*). Figure 2 shows how total payments change by counties (*megye*) when resources were allocated by the demographic formula.[4] Some regions show more than 10% divergence from the current public health care expenditures. In contrast, the population's health status (measured by potential years of life lost to age 70) presents a very dissimilar distribution. Health status compared to either current

[4] *In Figure 2 current public health care expenditure figures represent the majority (91%) of in-kind benefits financed by the NHIFA; health care expenditures are linked to the insurees' place of residence (not to the point of service); see more details on this analysis in the paper of Nagy et al (2007).*

expenditures or the demographic allocations indicates that there is very little in common across the current allocation of health care resources, the allocation suggested by the demographic formula and health care needs (measured by potential years of life lost to age 70). It would, therefore, seem essential that any formula goes beyond these easily available data to reflect differences in health need more faithfully.

Figure 2

Resource allocations in Hungary projected by age and gender compared to current public health care expenditures (2006) and potential years of life lost to age 70



Note: potential years of life lost to age 70 = potential years of life lost to age 70 per 100,000 citizens
Source: based on Nagy et al 2007.

Health-based Risk Adjusters

An extensive international literature indicates that adjusters directly measuring health status (health-based adjusters) receive top priority when designing risk adjusted capitation payments. The starting point for most of the health-based models is the concept that certain diagnoses and/or the prior use of medications indicate the presence of chronic conditions and predict future expenditures with reasonable accuracy ($R^2 \approx 0.15\text{-}0.20$)[5]. Health-based models have been developed - particularly in the US - and some of them have been adopted in Europe, such as pharmacy- (*Lamers and van Vliet 2004*, *Zhao et al 2005*, *Sales et al 2003*,

[5] *See the latter references on these values in this paragraph.*

Fishman et al 2003, *Gilmer et al 2001*), ambulatory- (*Weiner et al 1996*, *Welch 2002*), and in-patient (*Ellis et al 1996*, *Ash et al 2000*, *Kronick et al 1996*, *Antioch and Walsh 2002*) care models as well as combined information models to identify the cost of patients.

Hungary certainly has the option of pursuing this route, as a particularly rich patient level dataset is available for the majority of health care provision; however, there are limitations to instant application. First, we cannot dismiss the fact that health care utilization data have the potential to present incentives to data manipulation or could lead to provider misbehaviour and other non-intended responses by the devolved organizations. These issues have rarely been satisfactory addressed in the literature (*Lamers and Vliet 2003*, *Ellis 2002*). Another difficulty is that utilization data, particularly in Hungary, often reflect a distorted provider structure (see Figure 2). Therefore variations in spending may not only be due to variations in individual needs (legitimate factors) but also to variations in the supply of services (illegitimate factors). Without the elimination of these factors the health-based formula would reflect utilization patterns rather than real health care needs.

There has been some experience in Hungary concerning the application of health-based adjusters. In 2002 the demographic model of the experimental managed care program (*Mihályi 2003b*) was extended by one health-based risk adjuster so that patients with chronic dialysis treatment received extra compensation in the capitation payment scheme (*Nagy et al 2003*, *Nagy et al 2005b*). It was suggested that this risk adjuster presented a good reflection of health care needs and that it was not distorted by illegitimate supply signs (*Nagy et al 2005a*). It is important to bear in mind that the case of dialysis treatment might be one of the rare examples; health-based variables that are derived from utilization data will need very cautious implementation.

Non Health-based Risk Adjusters

Risk adjusters that do not rely directly on health status (non health-based adjusters) usually comprise employment/disability status, geographical location, social factors and other measures. Despite the fact that these variables have a less direct relationship with health care needs, the rationale behind their use is that they are less vulnerable to data manipulation, often permit access to rich aggregate data sources and have the potential to allow for those elements of need that cannot be captured by health-based adjusters (*Smith et al 2001*).

In Hungary, to our knowledge, the vast majority of the data on non health-based adjusters is available only at an aggregate level. Small geographical units (173 small areas) with a population size of 7,000–250,000 people provide measures on various social, economic, cultural, educational, infrastructural and employment factors; these data are routinely collected by the Hungarian Central Statistician Office. An important limitation of the use of such aggregate data is the phenomenon referred as the ecological fallacy: the possibility of identifying a relationship between a potential risk adjuster and health care expenditures at the aggregate level that does not hold at the individual level (*Selvin 1958*). The potential for ecological fallacy seriously undermines the practical applicability of aggregate data; however their use, given the lack of individual level data, often seems inevitable. There is also a common feeling among decision makers that socio-economic variables (even on the aggregate level) reflect populations' health care needs better than individual level health care utilisation data. Therefore non health-based adjustment should be regarded as an important technique to consider for the improvement of the formula.

A Hybrid Model of Risk Adjustment

Hungary can be viewed as a country that has a relatively broad choice of risk adjusters and therefore various options to pursue. Therefore a hybrid capitation model is suggested that embodies different types of adjusters and compromises between the theoretically best performing but potentially biased health-based adjusters and the less accurate but more credible non health-based adjusters. An attainable model development scenario might be to:

- introduce demographic adjusters (age and sex)
- develop non health-based adjusters (e.g. social, economic, cultural, educational, infrastructural and employment factors)
- add simple measures of chronic health conditions – at first those that are easily determined and not likely to suffer from distortion effects (e.g. based on data on patients on chronic dialysis treatment)
- introduce complex health-based models, but only on condition that the system is able to control supply side effects (illegitimate adjusters and perverse incentives).
  There is probably a long way to go to get to this final model and it is important to see that the introduction of risk adjusters is only one element of the capitation scheme which needs to be followed by various complementary policies.

Complementary Policies

Risk adjustment is usually blended with complementary strategies; risk sharing is regarded as the most common element of capitation schemes.

Risk Sharing

Risk sharing implies that health plans are retrospectively reimbursed for some of the expenditures of some of their members. Although risk sharing effectively reduces organizations' incentive for risk selection, it also reduces their incentive for efficiency (*van Barnevald et al 2001*). If health plans know that they will be retrospectively reimbursed for some of their deficits, risk sharing may serve as a disincentive to operate efficiently. This is in sharp contrast to risk adjustment that introduces incentives to operate efficiently (*Newhouse 1998*). Therefore risk sharing is usually considered as the "second best" strategy that follows risk adjustment.

There are several ways of risk sharing; however the exact method is usually the subject not only of scientific questions but political, ethical and social judgments. Under "proportional risk sharing" a certain fraction of expenditures are shared. Another method is "outlier risk sharing" where all expenditures above a certain threshold are reimbursed. With "risk sharing for high risks", health plans are free to select a certain percentage of their members for whom some risk is shared. "Condition specific risk sharing" implies that members with certain medical conditions are selected to have their costs shared (*van den Ven and Ellis 2000*).

In Hungary, especially at the early stage of implementation, risk sharing as a complementary strategy is expected to have a dominant role. There are two arguments

for this: (1) the early capitation payment formula (e.g. based on age and gender) is not expected to accurately compensate health plans for their high risk members and this would introduce incentives for selection; (2) as demonstrated in Figure 2 the reallocation effect of any payment formula (even a perfect one) would be too large in comparison to current health spending (see Figure 2) and such reallocation across regions would threaten health care delivery. The February 2008 health care reform plans set out a high level of proportional risk sharing: 80% of sickness funds' (health plans) costs were to be reimbursed on the basis of their current expenditures. This is in line with the international experience that suggests a relatively large proportion of risk sharing at the launch of immature capitation systems. For example in the Netherlands in certain services 70%-95% of sickness funds' costs, and in Belgium 90% of costs, were reimbursed in the early phase of the capitation system (*Schokkaert and Van de Voorde 2003*, *Lamers et al 2003*)

Timing and Mixture of Policies

Capitation schemes are usually phased in with great caution. The key element is certainly the evolution of the risk adjustment formula; mainly because it is the most helpful in achieving resource allocation goals (equity and efficiency) and also because it directly affects all the other policies applied with the capitation payment scheme. The accuracy of the formula strongly determines to what extent risk sharing mechanisms should be applied. Similarly, the new risk adjusters in the formula define the provider control mechanisms to be introduced. The formula development should be balanced between two basic requirements. On the one hand the formula should be moving towards the populations' anticipated health care needs – a requirement of equitable resource allocation. On the other hand the devolved organizations should be compensated for their high risk members so that there remains little incentive for risk selection – an argument for efficient resource allocation. At present the equity argument has a priority, although international experience suggests that where regulated (sickness fund) competition is present selection becomes the leading edge in the long run (*Van de Ven W et al 2007*). A persistent tension is also expected between the technical accuracy of the formulae - which promotes efficiency and equity – and the desire for simplicity – which promotes political accountability (*Sheldon 1997*); this tension usually slows down the formula development process. As a result, the complete process of defining a funding formula that meets the designated resource allocation goals and that successfully comprises risk adjustment, risk sharing and other complementary policies is expected to take a minimum of 5-10 years. Future research should primarily focus on the exact method of risk adjustment to which all other capitation policies adjust. Hungary is just about to take the first steps on the path that the Netherlands, England, Germany, Belgium, Sweden, the United States and many other countries have been following for decades. There is no question about the difficulties Hungary will have to face, but based on these countries' experiences we believe that many of their problems can be circumvented in future.

Concluding Remarks

The broad challenge faced by Hungary is to adopt a new health care system approach to improving the performance of the health care sector while preserving historically strong

principles of equity. This has been considered in various health reform proposals in which devolved health care delivery schemes are implemented and the allocation of resources is carried out through the capitation payment mechanism. Capitation based resource allocation faces two broad challenges. Firstly, there are large inequities in the access to health care delivery that need correction. Secondly, although efficiency is encouraged by the budget constraints imposed by capitation, risk selection is also threatened. Therefore capitation methodology has an important role in securing equal access for equal needs and in preventing incentives for risk selection. To achieve these goals the improvement of the capitation payment scheme with the risk adjustment method is recommended in the first place where a blend of health-based and non health-based adjusters are foreseen. Risk sharing elements are secondary, although they may have a dominant role during the early implementation of the capitation payment system. Thirdly, a relatively long transitional period with gradual implementation and an adequate balance of complementary policies are suggested. These elements together, secure a sustainable, accountable and acceptable playing field to all actors in the prospective Hungarian health care system.

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