



## **Centre for Actuarial Research (CARE)**

**A Research Unit of the University of Cape Town**

# **Risk Equalisation Methodologies : An International Perspective**

**CARE Monograph No. 3**

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## Synopsis

In order to preserve social solidarity in healthcare, governments impose regulation of health funders to entrench community rating and open enrolment. Community rating and open enrolment are normally accompanied by mechanisms for risk equalisation between the funds operating in that market.

Countries which have introduced such a form of risk equalisation include: Australia, Belgium, Canada, Colombia, Finland, Germany, Czech Republic, Ireland, Israel, Netherlands, New Zealand, Norway, Russian Federation, Sweden, Switzerland, United Kingdom and the United States. Chile is considering the introduction of risk equalisation. In South Africa, community rating has been re-introduced from January 2000 but without a mechanism for risk equalisation.

The monograph provides details of a selection of the risk equalisation methodologies in use internationally in 2001, and describes their role within the relevant health systems.

The reasons for the introduction of risk equalisation and the evolution of the methodology are of particular interest. Wherever possible, technical details of the calculation methodology are provided.

The factors used in these models to predict health expenditure vary from demographic (such as age, gender or region) to more complex systems involving health status. Many of the models that were initially implemented were crude predictors of health costs, and provided limited success. However, as data systems improved and research into this field has grown, the models have become increasingly complex, particularly in the United States.

A key lesson from this is that the implementation of such a measure need not aim to be perfect. Instead, it is an on-going process which needs to be updated and revised regularly in order to remain relevant and effective.



In considering the complexity of the systems and their sometimes tortuous evolution, the authors are reminded of an earlier, more simple health funding environment :

*"Pay the physician as long as you are well"*  
(maxim of Confucius).

# Table of contents

|  |           |
|--|-----------|
| Synopsis.....                                    | ii        |
| Table of contents .....                          | iii       |
| Glossary .....                                   | vi        |
| <b>1. Introduction.....</b>                      | <b>1</b>  |
| 1.1 Background .....                             | 1         |
| 1.2 Objectives of Research .....                 | 1         |
| 1.3 Sources of Information and Limitations ..... | 1         |
| 1.4 Availability of Source Material .....        | 2         |
| 1.5 Acknowledgements.....                        | 2         |
| <b>2. Terminology.....</b>                       | <b>3</b>  |
| <b>3. Australia.....</b>                         | <b>5</b>  |
| 3.1 Outline of Health System.....                | 5         |
| 3.2 Objectives of Risk Equalisation.....         | 6         |
| 3.3 The Method Currently Used .....              | 7         |
| 3.4 The Calculation.....                         | 8         |
| 3.5 Problems with the Current System .....       | 9         |
| 3.6 The Evolution of Risk Equalisation.....      | 10        |
| <b>4. Belgium .....</b>                          | <b>12</b> |
| 4.1 Outline of Health System.....                | 12        |
| 4.2 Objectives of Risk Equalisation.....         | 13        |
| 4.3 The Method Currently Used .....              | 14        |
| 4.4 Problems with the Current System .....       | 18        |
| 4.5 The Evolution of Risk Equalisation.....      | 19        |
| 4.6 Proposed Changes.....                        | 19        |
| <b>5. Colombia.....</b>                          | <b>20</b> |
| 5.1 Outline of Health System.....                | 20        |
| 5.2 Objectives of Risk Equalisation.....         | 20        |
| 5.3 The Method Currently Used .....              | 21        |
| 5.4 Problems with the Current System .....       | 21        |
| <b>6. Czech Republic.....</b>                    | <b>22</b> |
| 6.1 Outline of Health System.....                | 22        |
| 6.2 Objectives of Risk Equalisation.....         | 22        |
| 6.3 The Method Currently Used .....              | 23        |
| 6.4 The Calculation.....                         | 23        |
| 6.5 Problems with the Current System .....       | 24        |
| 6.6 The Evolution of Risk Equalisation.....      | 24        |

|  |           |
|--|-----------|
| <b>7. Germany .....</b>                      | <b>25</b> |
| 7.1 Outline of Health System.....            | 25        |
| 7.2 Objectives of Risk Equalisation.....     | 26        |
| 7.3 The Method Currently Used .....          | 26        |
| 7.4 The Calculation.....                     | 28        |
| 7.5 Problems with the Current System .....   | 29        |
| 7.6 The Evolution of Risk Equalisation.....  | 29        |
| <b>8. Ireland.....</b>                       | <b>30</b> |
| 8.1 Outline of Health System.....            | 30        |
| 8.2 Objectives of Risk Equalisation.....     | 33        |
| 8.3 The Method Currently Used .....          | 34        |
| 8.4 The Calculation.....                     | 37        |
| 8.5 Problems with the Current System .....   | 41        |
| 8.6 The Evolution of Risk Equalisation.....  | 41        |
| <b>9. Israel.....</b>                        | <b>44</b> |
| 9.1 Outline of Health System.....            | 44        |
| 9.2 Objectives of Risk Equalisation.....     | 44        |
| 9.3 The Method Currently Used .....          | 45        |
| 9.4 Problems with the Current System .....   | 47        |
| 9.5 The Evolution of Risk Equalisation.....  | 47        |
| 9.6 Proposed Changes.....                    | 48        |
| <b>10. Netherlands.....</b>                  | <b>49</b> |
| 10.1 Outline of Health System.....           | 49        |
| 10.2 Objectives of Risk Equalisation.....    | 51        |
| 10.3 The Method Currently Used .....         | 51        |
| 10.4 Problems with the Current System .....  | 52        |
| 10.5 The Evolution of Risk Equalisation..... | 52        |
| <b>11. New Zealand.....</b>                  | <b>54</b> |
| <b>12. Russian Federation .....</b>          | <b>55</b> |
| 12.1 Outline of Health System.....           | 55        |
| 12.2 The Method Currently Used .....         | 56        |
| <b>13. Switzerland .....</b>                 | <b>57</b> |
| 13.1 Outline of Health System.....           | 57        |
| 13.2 Objectives of Risk Equalisation.....    | 57        |
| 13.3 The Method Currently Used .....         | 58        |
| 13.4 The Calculation.....                    | 59        |
| 13.5 Problems with the Current System .....  | 60        |
| 13.6 The Evolution of Risk Equalisation..... | 61        |

|  |           |
|--|-----------|
| <b>14. United Kingdom</b>                          | <b>62</b> |
| 14.1 England                                       | 62        |
| 14.2 Northern Ireland                              | 66        |
| 14.3 Scotland                                      | 68        |
| 14.4 Wales   | 69        |
| <b>15. United States of America</b>                | <b>71</b> |
| 15.1 Outline of Health System                      | 71        |
| 15.2 Medicare                                      | 71        |
| 15.3 Medicaid                                      | 72        |
| 15.4 Restriction of Research                       | 73        |
| <b>16. Other countries</b>                         | <b>74</b> |
| 16.1 Association Internationale de la Mutualité    | 74        |
| <b>17. Comparison of Models</b>                    | <b>75</b> |
| <b>18. Brief Lessons from the Research</b>         | <b>77</b> |
| <b>References</b>                                  | <b>78</b> |
| <br>   |           |
| <b>APPENDIX A – Subtle Risk Selection</b>          | <b>83</b> |
| <b>APPENDIX B – Belgium : Law Leburton</b>         | <b>84</b> |
| <b>APPENDIX C – Netherlands : Before 1999</b>      | <b>85</b> |
| <b>APPENDIX D – Israel : Basic Basket</b>          | <b>88</b> |
| <b>APPENDIX E – Israel : Risk Sharing Payments</b> | <b>89</b> |
| <b>APPENDIX F – England : Need Index</b>           | <b>90</b> |
| <b>APPENDIX G – Northern Ireland : Weightings</b>  | <b>92</b> |
| <b>APPENDIX H – Scotland’s age/sex weights</b>     | <b>96</b> |

# Glossary

## **Adverse Selection**

This occurs when an insured person selects an insurer that charges a premium which is lower than his/her expected cost of health. A result of adverse selection is the tendency for high risk people to purchase insurance, while low risk people opt out.

## **Ambulatory Care Group (ACG)**

This is a classification system, whereby patients are grouped according to inpatient diagnoses. There are different methodologies used to achieve this grouping, including Diagnosis Related Groups (DRGs).

## **Ancillary Care**

This includes services such as physiotherapy, speech and occupational therapy, dentists and opticians.

## **Capitation Payments**

This is a reimbursement system which involves the organisation at risk receiving a fixed fee for each patient treated. These payments are often adjusted, through a risk equalisation mechanism, for certain factors such as sex and gender

## **Casemix**

This describes the mix and type of patients that are treated by a hospital (as determined by their medical conditions)

## **Copayments**

This occurs when the patient is not fully reimbursed for costs of treatment. Instead, the patient has to meet some of the costs at the point of delivery.

## **Community Rating**

This refers to a restriction on the premium that insurers can levy. Typically, the cost of a certain level of insurance is the same for all members without consideration for their perceived risk.

There are two main types of community rating: **single rate community rating** (premiums are all equal for all members with a certain level of cover) and **lifetime community rating** (premiums are rated according to age at entry, but are otherwise equal).

## **Cream Skimming** (*See Risk Selection*)

## **Demographic Factors**

These are variables that describe certain characteristics of an insured population, and are associated with expected health care costs. Examples include age, gender, region and family status.

**Diagnostic Cost Group (DCG)**

This is a model which is based on inpatient hospitalisation data to classify members into risk groups.

**Diagnostic Related Groups (DRG)**

This is a classification system which is based on medical diagnoses.

**Fee-for-Service**

This is a reimbursement system, under which providers receive a retrospective payment for each service provided.

**Health Status Factors**

These variables are used to predict health care costs on the basis of specific health related data (e.g. diagnoses).

**Inpatient**

This refers to a patient who is admitted to hospital (or other such facility) for one or more nights.

**Open Enrolment**

Under a system of open enrolment, all applicants are guaranteed acceptance for cover, regardless of their risk profile.

**Outpatient**

This refers to a patient who receives treatment without occupying a ward bed.

**Per Diem payments**

This is a reimbursement mechanism which pays a fixed amount to providers for each day of hospital inpatient care.

**Risk Equalisation** *(see Table 2.1 for related terms)*

This is a mechanism used to redistribute or allocate resources to insurers (or other people at risk), in order to more accurately reflect the expected costs of the risk structure of the insureds actually enrolled.

**Risk Rating**

This is a method used to levy premiums, under which members are charged according to their perceived risk to the insurer.

**Risk Selection (Cherry Picking, Cream Skimming)**

This occurs when insurers select to insure people whose expected costs are lower than the expected cost of the population for whom the premium has been set.

*Sources: n/e/r/a, "Risk Adjustment and Its Implications for Efficiency and Equity in Health Care Systems"; HCWP, "Private Health Insurance in Ireland: Challenging Times"; Advisory Group to the Minister for Health on the Risk Equalisation Scheme, "Report of the Advisory Group on the Risk Equalisation Scheme".*

# **1. Introduction**

## **1.1 Background**

Health systems across the world are faced with rising medical costs and increased demand which threaten the viability of the system. Insurers and health funds in competitive markets have in many cases responded by selecting those members who present low health risks (known as risk selection or cherry picking), leaving those with the greatest need uninsured, and unable to obtain health care in their own capacity.

In order to preserve social solidarity in healthcare, governments impose regulation of health funders to entrench community rating and open enrolment. Community rating and open enrolment are normally accompanied by mechanisms for risk equalisation between the funds operating in that market.

In South Africa, compulsory community rating of private sector medical schemes was restored in January 2000 by the Medical Schemes Act, No. 131 of 1998. Early drafts of the legislation reserved the right for the Minister of Health to introduce a risk equalisation system. However in January 2000 the return to community rating went ahead without a risk equalisation mechanism in place.

Initial research on the potential of risk equalisation mechanisms was published in South Africa by Söderlund and Khosa in 1997. They considered the mechanisms implemented in a number of countries, but at that stage, few had been in operation for any length of time.

## **1.2 Objectives of Research**

The monograph provides details of a selection of the risk equalisation methodologies in use internationally in 2001, and describes their role within the relevant health systems.

The reasons for the introduction of risk equalisation and the evolution of the methodology are of particular interest. Wherever possible, technical details of the calculation methodology are provided.

## **1.3 Sources of Information and Limitations**

Journals and other publications provided much of the background information for this work. Research was then conducted through the internet and in particular, government websites. Email was an especially important tool, as it allowed direct communication with those responsible for the risk equalisation mechanism in certain countries.

The extensive use of electronic communication enabled access to current information, which is particularly important in an area which is developing rapidly.

The health environment is dynamic and constantly subject to reform, with information aging quickly. As such, any research thereof cannot be guaranteed to be completely accurate. Further, writing about systems from an outside perspective can often be misleading, and as Jost states:

*"writing about the Dutch health care system from a distance is a risky enterprise because it changes so often ...."*

*Source : Jost TS, "Private or public approaches to insuring the uninsured"*

This monograph could not fully describe each health system, but merely aims to outline those aspects particularly relevant to the risk equalisation methodology, in order to assist comparison.

This monograph does not purport to be an exhaustive collection of countries which may have implemented risk equalisation. Attempts have been made to gather information on countries frequently referred to with regard to risk equalisation.

## **1.4 Availability of Source Material**

Readers may wish to access particular source documents listed in the reference section. A copy of each document, either on paper or electronically, is lodged with the Centre for Actuarial Research at the University of Cape Town. Our donor community are welcome to make full and free use of the Centre resources and library.

Many documents have additionally been lodged with the Resource Centre of the Council for Medical Schemes in Pretoria.

## **1.5 Acknowledgements**

Obtaining relevant (sometimes unpublished) information can be challenging, and relies on the generous assistance of a number of people. Many of the articles used were obtained through email contact between the authors of articles and Neil Parkin. Much of this research would not have been possible without their generous and open sharing of knowledge.

The authors wish to thank Dibuleng Mohlakwana, the tireless manager of the Resource Centre of the Council for Medical Schemes. Neil Parkin also wishes to acknowledge Marina Berenisco's assistance with medical issues.

Any errors that remain are solely the responsibility of the authors.

## 2. Terminology

One definition of risk equalisation is given as:

Risk equalisation is a mechanism used to redistribute or allocate resources to insurers (or other people at risk), in order to more accurately reflect the expected costs of the risk structure of the insureds actually enrolled.

*(Source : n/e/r/a, Risk Adjustment and Its Implications for Efficiency and Equity in Health Care Systems).*

The objectives and methodology of risk equalisation differ, depending on the characteristics of the health system of each country. In countries such as Australia where there are competing health insurers, risk equalisation aims to remove incentives to risk select, while in the United Kingdom (UK) risk equalisation aims to allocate resources equitably between government health organisations.

As with most international research, difficulties with terminology are rife. Some alternative and associated terms are given in the table below.

**Table 2-1: Table of Risk Equalisation Terminology**

| <b>Risk Equalisation</b>  | <b>Region/ Country</b> |
|---|------------------------|
| Risk Adjustment   |                        |
| Risk Equalization   | U.S.A.                 |
| Reinsurance   | Australia              |
| Risk (structure) compensation scheme <i>or</i> :<br>Risikoausgleichsverordnung (RSAV) | Germany                |
| Case-mix Adjustment   |                        |
| Loss compensation schemes   |                        |
| Normative Expenditures  | Belgium                |
| Weighted capitation   | England (UK)           |

*Sources: Oliver A J, "Risk Adjusting Health Care Resource Allocations"; Schokkaert E, Van de Voorde C, "Risk adjustment and the fear of markets: the case of Belgium"*

Note that the above terms are not necessarily restricted to the regions listed, and are sometimes used interchangeably within an area.

While “reinsurance” typically has a different meaning in an insurance sense, in Australia it is also used to refer to risk equalisation. As the Australian Private Health Insurance Administration Council (PHIAC) states:

*"Reinsurance is inaptly named...."*

Most countries use the terminology “health insurance” to cover a range of approaches for funding healthcare in advance. In South Africa, “health insurance” has a more limited applicability to those products sold by insurance companies. According to the definitions contained in the Long-Term and Short-Term Insurance Acts and the Medical Schemes Act, all of 1998, “health insurance” may not indemnify policyholders for expenditure on health services.

In South Africa indemnity health products are termed “medical schemes” and are governed by the Medical Schemes Act. All “health insurance” sold by insurers must be on a non-indemnity basis.

## 3. Australia

### 3.1 Outline of Health System

In Australia there are two nationally subsidised schemes: Medicare (the national public health service), provides publicly funded health care without any fee for service. The benefits are of an “internationally high standard”, according to Standard & Poor (S&P, “Australian Health Insurance Report 2001”). The Pharmaceutical Benefits Scheme subsidises a high proportion of prescription medications bought from pharmacies (Australian Institute of Health & Welfare (AIHW), “Australia’s Health 2000”).

According to the Private Health Insurance Administration Council (PHIAC) in its Annual Report 1999-2000, there were 44 registered health benefits organisations as at the end of June 2000. Of these 29 were open schemes (available to the public) and 15 were closed. Most of these funds are regionally focused and, according to Standard & Poor, typically collect in excess of 85% of their premiums in a single state.

By the end of September 2000, 45.8% of the population had private health insurance (S&P). This compares to the figure of 50.2% in June 1984, which had decreased to 30.5% at the end of June 1999 (AIHW). Hence it would appear that the decline in private health coverage has, at least temporarily, stabilised. This is largely due to the government’s efforts in creating incentives to use private health insurance, rather than relying on the public system.

January 1999 saw the introduction of a 30% rebate on private health insurance premiums. The government’s actions are in response to the growing pressure being exerted on the public health system as health care costs rise and the Australian population ages.

By law, private health insurers have to provide for open enrolment and community rating, whereby there is a single rate for adults (over 18 years of age), and double that rate for married couples, regardless of dependent children.

As of 1 July 2000, health funds are able to risk rate based on age at date of entry to a fund. This is termed Lifetime Community Rating, or Lifetime Health Cover, whereby an insurer can set higher premium for new entrants aged 31 and over (S&P). Essentially, this aims to recognise the length of membership, and reward members who take out health insurance while young and maintain it.

The process works by assigning each member a "certified age at entry", which is their age at which they first take out private health insurance (with hospital cover). Members who join at, or under the age of 30, pay a *base rate premium*, while those members who join after the age of 30 pay a *premium loading* on top of the base rate. For each year a member is over the age of 30 on joining, a loading of 2% is added to the base rate. The maximum loading allowed is 70%, which is equivalent to taking out health insurance for the first time at age 65. Each health fund sets its base rate for a certain level of cover.

In order to facilitate transfers between insurers, all health funds have to recognise the "certified age at entry" of members. Further, members can cease their membership without being penalised. A cumulative 24-month absence will be allowed throughout a member's lifetime without affecting their "certified age at entry". After this, however, their "certified age at entry" will increase by one year for each additional year of absence.

Lifetime Health Cover is intended to improve the risk profile of the private health insurance industry, as more young lives take insurance out, making insurance more affordable. Together with the 30% rebate policy, it aims to alleviate pressure on the public health system. (Private Health Industry Branch, "Lifetime Health Cover")

The maximum waiting period is 2 months (except for obstetrics and pre-existing conditions which have a 12 month waiting period).

Insurers are further required to offer a basic level of insurance, and may also offer a supplementary level. The basic level covers the cost of a public hospital ward with treatment by the patient's own doctor (otherwise termed "semi-private ward in a public hospital"). The supplementary level covers the cost of private rooms in public hospitals, and treatment in private hospitals.

Additional non-hospital benefits (so called 'ancillary benefits') such as dental care, physiotherapy, optical services, prescription drugs and alternative medicine, are also offered by private insurers.

## **3.2 Objectives of Risk Equalisation**

The main reason cited for risk equalisation (or "reinsurance") in Australia is to support community rating, so as to allow funds to charge premiums that are competitive, regardless of their risk composition (Private Health Industry Branch, "Reinsurance").

The Industry Commission ("Private Health Insurance", 1997) goes further to state that without risk equalisation the health industry could become unstable as medical funds with a large proportion of high risk lives are forced to increase premiums. In turn, low risk members move away from these funds, leaving a higher proportion of high risk members, thus forcing the premiums higher.

The Australian Private Hospitals Association (APHA) in their Comment on the Productivity Commission's "Private Health Insurance Discussion Draft," identify a further role as reducing the incentive to "cream skim" or risk rate.

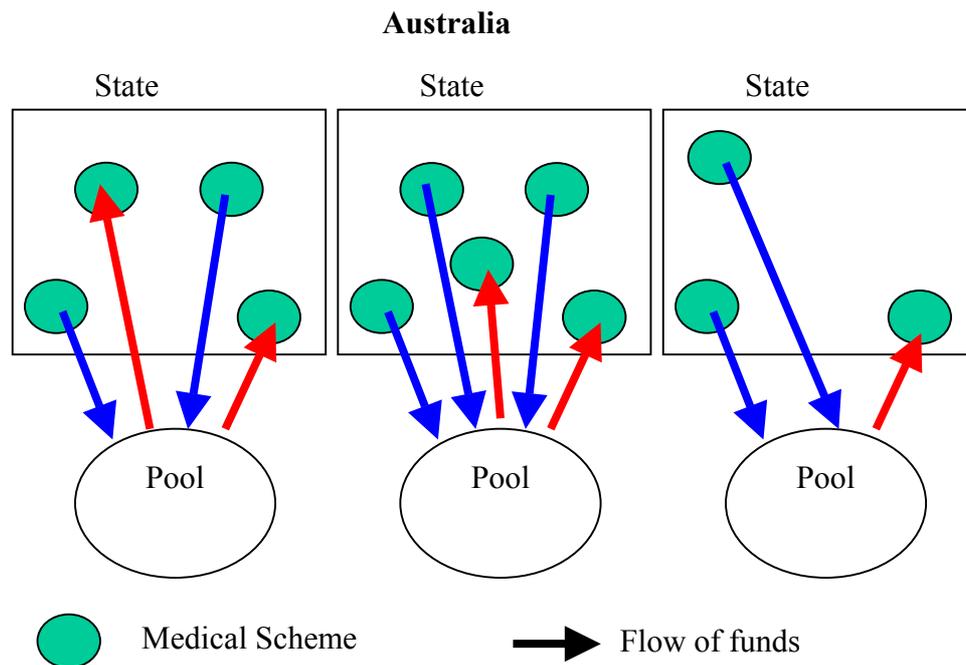
### 3.3 The Method Currently Used

The procedure, which is administered by the Private Health Insurance Administration Council (PHIAC), is based on two risk adjusters: *age* and *chronic illness*. Risk equalisation applies to members who:

- are 65 years of age or over, **or**
- have been hospitalised for longer than 35 days in any one year (as a proxy for chronic illness).

Of the total benefits paid to members in these categories, 79% is redistributed on a pro rata basis. This is to ensure that funds have an incentive to control costs and not to pass them onto the risk pool (Private Health Insurance Administration Council (PHIAC), “Reinsurance”). According to the Industry Commission (Private Health Insurance, 1997), people with private health insurance aged 65 or above have a hospital utilisation rate that is 5.8 times that of those under the age of 65, emphasising the need for this age category as a risk adjuster.

Out-of-hospital and ancillary benefits are not included in the risk equalisation calculation.



**Figure 3.1: Flow of Funds in Australian Risk Equalisation System**

The current system of risk equalisation is state-based, with each of the seven states having its own distinct risk equalisation pool, as is illustrated in figure 3.1 above.

Private Health Insurance Organisations report data (membership, hospital benefits, and ancillary benefits) on a quarterly basis to the PHIAC (Private Health Insurance Administration Council (PHIAC), “Reinsurance”). The data is provided by each fund for each state, and is collected at the end of the quarter.

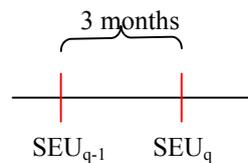
### 3.4 The Calculation

Membership is defined in terms of “Single Equivalent Units” (SEU), where a single member is regarded as 1 SEU, and all other categories (married, family etc.) are considered as 2 SEUs. It is compulsory for organisations with 500 or more SEUs in a particular state to participate in the risk equalisation scheme in that state.

The first step in the calculation is to derive the average membership of a fund  $i$  ( $A_i$ ):

$$A_i = \frac{(SEU)_q + (SEU)_{q-1}}{2}$$

Where SEU represents Single Equivalent Units, with  $q$  the value at the end of the current quarter, and  $q-1$  the value at the end of the previous quarter.



- Let  $B_i$  = benefits paid by fund  $i$  during the quarter.  
 $\sum B_j$  = total benefits paid by all funds in the state  
 $\sum A_j$  = total members with private health insurance in the state

All the above benefits refer to those paid to members over 65 years of age, or to those members with hospitalisation for more than 35 days (in any one year).

Now, the payment **to** the pool for fund  $i$  ( $P_i$ ) is:

$$P_i = [(\text{weighted share of benefits based on membership}) - (\text{actual share})] \times 0.79$$

$$= \left[ \left( \frac{A_i}{\sum A_j} \times \sum B_j \right) - B_i \right] \times 0.79$$

Clearly, if the actual share of benefits ( $B_i$ ) exceeds the share based on membership, then the fund will receive a payment, and vice versa (PHIAC, “Reinsurance”).

### 3.5 Problems with the Current System

APHA, in its Comment on the Productivity Commission's "Private Health Insurance Discussion Draft", suggest that since risk equalisation is benefits based, there is an incentive not to control costs. The Industry Commission's report Private Health Insurance (1997), agrees with this saying that it "provides sometimes perverse incentives against full cost minimisation," and further that it limits the scope for innovative products, eliminating the possibility of specialisation in health products (since these would also fall under the scope of risk equalisation).

The report shows that *out-of-hospital health care* could be discouraged since only hospital benefits are included in the risk equalisation pool. Thus a health fund would encourage an old person to have an expensive hospital treatment, rather than inexpensive, but on-going, ambulatory care. In the former case, the fund would only pay 21% of the hospital costs (79% is covered by the risk equalisation scheme), whilst with ambulatory care it would have to cover the entire cost. Compounded with this, there is possibly an incentive to seek methods of care that keep patients in hospital for more than 35 days, by encouraging the use of long duration (and more expensive) hospital procedures, rather than short duration (and less costly) treatments. However, the Industry Commission found no evidence that this is actually done, and were of the opinion that the impact on efficiency would be minimal.

An important issue covered by the Industry Commission is that of equity. While one of the objectives of risk equalisation is equity, it is questionable whether it is realised. As the Industry Commission states, "*reinsurance is a relatively blunt instrument for risk equalisation,*" something that stems from the simplicity of the form currently in use. Through the use of only two risk adjusters (age over 65 years and chronic illness), other risk profiles are neglected:

- Females compared to males
- Females of child-bearing age compared to other females
- Number of dependents (children)
- Members aged in early 60s compared to younger aged members
- Very old people compared to people just over the age of 65

Any health fund with a high proportion of these risk groups will be disadvantaged by the current risk equalisation scheme, and creates the opportunity for funds to cream skim.

Further, this system creates incentives to create exclusionary products, or so-called "Swiss cheese policies", which compromises the objectives of risk equalisation. Such policies target less risky groups, such as the young and healthy, without officially preventing the high-risk groups from joining. An example of such a policy would be one that excluded treatment for hip-replacements or diverticulosis (an age related disease affecting the colon) - conditions that mainly affect by the elderly. The result of this is lower premiums for the fund using "Swiss cheese" policies.

Clearly this would be attractive to young members of other funds that cover age-related procedures (hence with higher premiums), who would have an incentive to change funds, leading to even higher premiums in the fund they left. It may also have the effect of attracting new members into the private health industry.

The net effect is differences in premium levels between risk groups – something that negates and undermines community rating. The Industry Commission emphasises that although the current system creates incentives for “Swiss cheese” policies when compared to a system of broader risk adjusters, it does not encourage them. If no system of risk equalisation existed, these policies would be priced at much lower premiums, having a greater impact on the market (see Appendix A).

Since the current risk equalisation system is “state based”, with each state having its own risk equalisation pool, it neglects to take the age distribution of each state into account. As such it does not compensate states with older population distributions.

Another problem already encountered in 3.1 is that the Australian private health insurance market appears to be contracting (Health Care Working Party of the Society of Actuaries in Ireland (HCWP), “Challenging Times”). According to the HCWP, the public health service has improved substantially, and more people are relying on it.

Further, those employers practicing self-insurance do not have to participate in the risk equalisation. This tends to increase the average age of the population with private health insurance, and hence increases the level of community rates, making the public system more attractive.

Standard & Poor’s “Australian Health Insurance Report 2001” summarises the above problems succinctly:

*"The industry realises that this system cannot continue in its current form without placing considerable pressure on insurers themselves, and ultimately community rating...." Pg. 9*

### **3.6 The Evolution of Risk Equalisation**

The concept of risk equalisation is not a new one to Australian health. Before 1970 the National Health Act allowed organisations to create “Special Accounts” in their medical and hospital benefit funds. These accounts were intended to provide cover for members who suffered from pre-existing conditions or chronic illness, and who would otherwise not be covered. The Government then reimbursed the deficits in the accounts.

The Health Benefits Trust Fund was created on 1 October 1976 to subsidise health funds for the cost of basic benefits for the chronically ill. Funds were partly subsidised for benefits paid in excess of 35 days hospitalisation in any 12-month period. The subsidy to the fund was passed through parliament each year.

On 1 June 1989, this was changed to extend cover for the chronically ill, and to further include the aged. Such a move was brought about largely through the activities of a commercial insurer in the State of Victoria which began to target young and healthy people. (HCWP, “Challenging Times”)

Under this new method the benefits were redistributed between the funds, and the government subsequently stopped subsidies from 31 December 1990.

The level of benefits that could be included was reduced to 85% on 1 January 1995, as well as the introduction of two separate pools for “basic and supplementary” benefits. Six months later (June 1995) this was returned to a single pool, with a further reduction in the level of benefits to 80%. This level was again reduced on 1 October 1995 to 79% in an attempt to achieve a fair distribution of hospital claims. Up until this time, Open Funds were obliged to participate in the risk equalisation process in a state if they had 5% or more of the total membership of the state. It was compulsory for Closed Funds with 500 Single Equivalent Units (SEUs), or more, residing in the state to participate. At this time, the 5% Open Fund rule was discarded, and the 500 SEU rule was extended to all funds. (PHIAC, “Reinsurance”)

## 4. Belgium

### 4.1 Outline of Health System

Belgium's health system is characterised by voluntary and compulsory health care. All citizens have compulsory health insurance covering major risks such as hospitalisation. For employees (including civil servants), those retired, widows and their dependents, this compulsory insurance extends to minor risks (e.g. GP, specialist, dental health and medicines). This group covers about 88% of the population. Those people who are self-employed (the remaining 12%) are not covered, but can take up voluntary health insurance (approximately 85% do so). In addition to this everybody has the option to take out supplementary cover for non-basic items. (van Doorslaer and Schut, "Belgium and the Netherlands Revisited")

Insurance is administered by five non-governmental non-profit National Associations of sickness funds (these associations comprise of a total of about 100 local "sickness funds"), and a public fund. A sickness fund's membership can vary from 400 000 to 450 000 members (Schokkaert and Van de Voorde, "Risk adjustment and the fear of markets: the case of Belgium"). The health insurance market is highly concentrated with 90% of the population being covered by the three largest organisations (van Doorslaer and Schut, "Belgium and the Netherlands Revisited").

The National Institute for Sickness and Disability Insurance (Rijksinstituut voor Ziekte en Invaliditeitsverzekering [RIZIV] or Institut d' Assurance Maladie et Invalidité [INAMI]) is a semi-public agency (responsible to the Minister of Social Affairs) that forms the central fund to which all insurers contribute, or receive payments, in the risk equalisation mechanism. The health budget is set at the beginning of the year and is largely based on the previous year's budget increased at a growth rate (Schokkaert and Van de Voorde, "Belgium: risk adjustment and financial responsibility in a centralised system").

Membership of a sickness fund is compulsory. Members can choose which fund to belong to, and can change every 3 months.

While sickness funds cannot expel any members, it is not obliged to accept every applicant. However, a fund openly discriminating would be subject to considerable social and political pressure. The public fund serves as an "insurer of the last resort" and has to accept all applicants (Schokkaert and Van de Voorde, "Belgium: risk adjustment and financial responsibility in a centralised system").

The compulsory 'basic benefits' offered, and the their associated "social contributions," are the same across all funds. This social contribution is income-dependent, and is jointly payable by both the employee and employer (unless the member is self-employed). The contributions are paid to the RIZIV (European Observatory on Health Care Systems, "Health Care Systems in Transition: Belgium 2000").

In addition to this, a small flat rate premium (which is community rated for all members of a particular national association of sickness funds) can be levied by the fund. This premium is not significant enough to influence a member's decision regarding the choice of fund. Sickness funds thus are forced to compete on the basis of efficiency and quality of service, as well as what supplementary insurance (in addition to the compulsory insurance) is available. A separate premium can be charged for any such supplementary insurance (Schokkaert and Van de Voorde, "Risk adjustment and the fear of markets: the case of Belgium").

Supplementary insurance can also be offered by private insurers, but sickness funds dominate the market. Note that private insurers cannot offer compulsory insurance cover. If a member takes out supplementary insurance with a sickness fund, then they must also use that fund for their compulsory insurance.

The supplementary cover offered varies markedly (even for sickness funds in the same national association), with premiums being set according to the age and social characteristics of the member (Schokkaert and Van de Voorde, "Belgium: risk adjustment and financial responsibility in a centralised system").

Apart from revenue raised from supplementary insurance and the flat rate premiums levied, a sickness fund's main source of income is from the social contributions which its members pay to the RIZIV, and a government per-capita subsidy (financed from general taxation), which is based on the risk profile of the sickness fund's members.

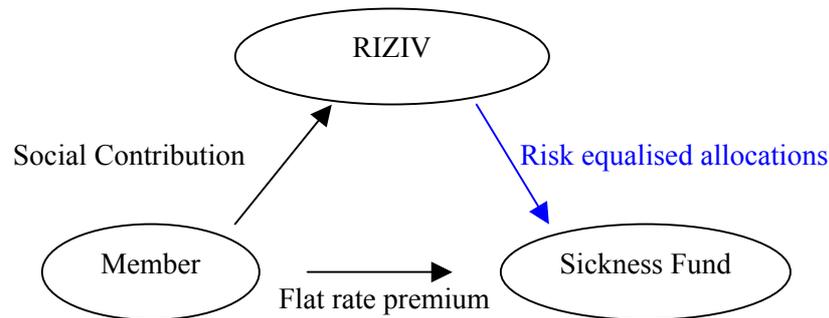
The total health budget is allocated by the RIZIV to the National Associations of sickness funds on the basis of a partially prospective (risk-equalised) and partially retrospective system (Schokkaert and Van de Voorde, "Belgium: risk adjustment and financial responsibility in a centralised system").

The providers of health care (e.g. doctors) are independent and are largely paid by fee-for-service. Members can choose which doctor or specialist they wish to consult, and are partially reimbursed by their sickness fund (about 75%). Hospital care is provided by private, non-profit and public hospitals (Schokkaert and Van de Voorde, "Risk selection and the specification of the conventional risk adjustment formula").

## **4.2 Objectives of Risk Equalisation**

The risk equalisation scheme in Belgium aims to preserve universal access to health care (Schokkaert and Van de Voorde, "Belgium: risk adjustment and financial responsibility in a centralised system").

## 4.3 The Method Currently Used



**Figure 4.1: Flow of funds in Belgium**

*Source: Schokkaert E, Van de Voorde C, Risk adjustment and the fear of markets: the case of Belgium*

Resources are allocated to national associations of sickness funds by means of a mixed reimbursement formula, which consists of a weighted average of “risk-equalised expenditure” and “actual expenditure”.

It should be noted that the total (fixed) budget is divided over the different social groups in proportion to actual expenditure in each group, with each allocation being treated separately.

$$F_i^s = \left(\frac{N_i^s}{\omega}\right)r\omega^s + \frac{E_i^s}{\sum E_j^s}(1-r)\omega^s$$

Where:

$F_i^s$  is the financial allocation to sickness fund  $i$  (from RIZIV) for social group  $s$

$\omega^s$  is the budget for social group  $s \therefore \sum F_i^s = \omega^s$

$\omega$  is the total budget  $\therefore \sum \omega^s = \omega$

$N_i^s$  is the risk-equalised expenditure of sickness fund  $i$  for social group  $s$

$E_i^s$  is the actual expenditure of sickness fund  $i$  for social group  $s$

$r$  is the weighting parameter (as set by the RIZIV), where  $0 < r < 1$

(Schokkaert Erik, Van de Voorde Carine, “Risk adjustment and the fear of markets: the case of Belgium”).

This can be interpreted as the division of the health budget  $\omega$  (which is fixed at the beginning of the year) into two components by  $r$ . The first component  $r\omega$  is allocated *prospectively* to sickness funds in proportion to their risk-equalised expenditures. The second component  $(1-r)\omega$  is allocated *retrospectively* to sickness funds in proportion to their actual expenditure.

Since the second component is only allocated at the end of the year, the value for  $F_i$  (i.e. the total amount allocated to sickness fund  $i$ ) can only be determined then too. In order to facilitate operations, advanced payments (based on the previous year's allocation) are made to sickness funds during the year.

In 1995 the weighting parameter  $r$  was set to 0.10. Over time this has been increased to 0.30 in 2001 and 2002. In 2003 this will increase to 0.40. Thus gradually, and in a cautious manner, more weighting is being given to the risk-equalised expenditure.

If  $r$  is set to 1, then the system would be a completely prospectively financed system, while  $r$  set to 0 gives the pre-1995 system (except for the fact that the budget is now fixed in advance). (Schokkaert and Van de Voorde, "Risk adjustment and the fear of markets: the case of Belgium")

The risk-equalised expenditure ( $N_i^s$ ) for each insurer (and for each social group  $s$ ) is determined by a risk equalisation formula before the actual expenditure is known. It represents the expected health care costs of insurer  $i$  on the basis of the risk composition of its members, and is calculated as follows:

$$N_i^s = \frac{n_i^s}{n^s} \omega^s + n_i^s \sum_{j \in S} \alpha^j (x_i^j - \bar{x}^j)$$

Where:

- $N_i^s$  is the risk-equalised expenditure of insurer  $i$  for social group  $s$
- $n_i^s$  is the number of members in social group  $s$  belonging to fund  $i$
- $n^s$  the total membership in social group  $s$  for all sickness funds
- $\omega^s$  is the budget for social group  $s$
- $\alpha^j$  the coefficient for risk factor  $j$
- $x_i^j$  sickness fund  $i$ 's value for risk factor  $j$
- $\bar{x}^j$  the national average for risk factor  $j$  (i.e. average of  $x_i^j$ )

This formula can be interpreted as an equal per capital distribution of the budget, with a correction term added to take into account any differences in risk.

Note that only certain risk factors apply to certain social groups. Thus the summation over  $j \in S$  means that it is taken over the factors relevant to social group  $s$  (Schokkaert and Van de Voorde, "Risk adjustment and the fear of markets: the case of Belgium").

The risk factors for each social group are defined as follows:

**Table 4-1: Risk factors per social group**

| <b>Social Group</b>                 | <b>Risk Factors</b>   |
|-------------------------------------|---|
| <b>Employees</b>                    |   |
| Active Population:                  | Gender, age (40-49), unemployment, civil servants, mortality, disability, urbanisation (density), urbanisation (quality of housing) |
| Invalids:                           | Number of dependants, mortality   |
| Pensioners:                         | Number of dependants, mortality, urbanisation (quality of housing)  |
| Widow(er)s & Orphans:               | Age (70-99), mortality  |
| <b>Self-Employed</b>                |   |
| Active self-employed:               | Number of dependants, income, mortality, urbanisation (density), urbanisation (quality of housing)                                  |
| Invalid self-employed:              | Age (70-99), income   |
| Retired self-employed:              | Age (70-99), number of dependants, urbanisation (density)   |
| Self-employed Widow(er)s & Orphans: | Age (80-99), mortality  |

*Source: Schokkaert Erik, Van de Voorde Carine, "Belgium: risk adjustment and financial responsibility in a centralised system"*

The coefficients (which were derived from regression analysis of 1995 aggregate data) of the risk factors for the active and pensioner social groups are defined in the following tables:

**Table 4-2: The Active Population**

| Variable j                 | $\alpha^j$ | $x_i^j$ (definition of variable)   |
|----------------------------|------------|--|
| Women                      | 24377      | Proportion of females in group (i,s)   |
| Age 40-99                  | 10856      | Proportion of members between ages 40-99 in group (i,s)  |
| Unemployment               | 33214      | Proportion of long-term unemployed members in (i,s)  |
| Civil servants             | 9919       | Proportion of civil servants in (i,s)  |
| Mortality                  | 1095614    | Average death rate/ total number of members in (i,s)   |
| Disability                 | 26843      | Proportion of active population with at least 1 day disability   |
| Urbanisation (qualitative) | 1163       | Indicator based on principle component analysis of the proportion of private houses built before 1919 & the proportion of private houses with little comfort |
| Urbanisation (density)     | 334        | Indicator based on principle component analysis of population density & the percentage of urbanised area   |

Source: Schokkaert E, Van de Voorde C, *Risk adjustment and the fear of markets: the case of Belgium*

Where an explanatory variable  $x_i^j$  is expressed as a proportion, the coefficients can be interpreted as the increase in expenditure for the group. Thus, on average, a female member costs 24 377 BEF more than a man.

For pensioners, there are two different groups: those without a preferential scheme (indicated by a NP) and those with (indicated by a P).

**Table 4-3. Pensioners**

| Variable j                 | $\alpha^j$ (NP) | $\alpha^j$ (P) | $x_i^j$ (definition of variable)   |
|----------------------------|-----------------|----------------|--|
| Dependants                 | -30210          | 8340           | Proportion of dependants in (i,s)  |
| Urbanisation (qualitative) | 2227            | 739            | Indicator based on principle component analysis of the proportion of private houses built before 1919 & the proportion of private houses with little comfort |
| Mortality                  | 1002759         | 126071         | Average death rate/ total number of members in (i,s)   |

Source: Schokkaert E, Van de Voorde C, *Risk adjustment and the fear of markets: the case of Belgium*

There has been much debate as to which variables should be included as risk factors. In particular, “Medical Supply” variables (number of hospital beds, number of providers of care) were very significant in the regression analysis, but were excluded from the risk equalisation formula.

The rationale behind this was the belief that sickness funds should not be compensated for differences in cost due to differences in medical supply, since provider density is high in Belgium. Regional health cost differences have also received attention as possible candidates for inclusion as risk factors (Schokkaert and Van de Voorde, “Risk adjustment and the fear of markets: the case of Belgium”).

Once the budget has been fully allocated to the sickness funds, the differences between that allocated and actual expenditure can be calculated as  $(F_i - E_i)$ .

A sickness fund’s responsibility for any difference is limited. In 1995 it was limited to 15% of the difference, but this was increased to 0.25 in 2000. Thus, if a fund has a surplus, it must set 25% aside in a reserve fund. If a deficit is incurred, then the sickness fund must use any reserves, or increase member’s flat rate premium to finance 25% of the deficit. The remaining 85% is offset by surpluses arising from other sickness funds. (Schokkaert and Van de Voorde, “Risk adjustment and the fear of markets: the case of Belgium”)

## **4.4 Problems with the Current System**

Clearly the calculation of the risk-equalised expenditure relies heavily on the estimation of the risk factor coefficients. Further, the adequacy of the risk factors can be questioned. What risk factors should be included in the equalisation mechanism is currently being debated in Belgium – particularly compensation for regional differences in medical expenditures, since the current form is inadequate and leaves scope for risk selection (Schokkaert and Van de Voorde, “Risk adjustment and the fear of markets: the case of Belgium”).

The risk equalisation formula is derived through regression analysis of aggregate regional data. Thus, while risk factors such as age are included, the full expenditure variation related to these factors is not captured. In order for this to be changed, a new risk equalisation formula based on individual-level data is required. Such data is not yet fully available (Van Doorslaer and Schut, “Belgium and the Netherlands Revisited”).

The sickness funds dominate the market for supplementary insurance. Since those members who take out supplementary cover with a particular sickness fund must also take out compulsory cover with that sickness fund, there exist large incentives to risk select in the supplementary market in order to indirectly risk select for the compulsory market. (Schokkaert, Van de Voorde, “Belgium: risk adjustment and financial responsibility in a centralised system”)

## 4.5 The Evolution of Risk Equalisation

The Health Insurance Law of August 9, 1963 (Law Leburton) set out the structure of the Belgian health care system, and therein created the RIZIV. While members paid contributions to the RIZIV, the government further subsidised the sickness funds. The Law Leburton proposed that the government subsidy be allocated according to a risk equalisation mechanism which would take into account the higher costs for certain groups within a fund's membership. This included pensioners, widows/ widowers, and the disabled (See Appendix B for the exact formula proposed) (Schokkaert and Van de Voorde, "Risk adjustment and the fear of markets: the case of Belgium").

This risk equalisation mechanism was however, never adopted in practice due to the fact that it failed to fully compensate for the risk groups. Instead, all expenditures were simply reimbursed, offering little incentive to contain costs, as well as little incentive to risk select (Schokkaert and Van de Voorde, "Belgium: risk adjustment and financial responsibility in a centralised system").

The Law of February 15, 1993 (the Law Moureaux) gave financial responsibility to each sickness fund, in the hope of promoting efficiency and cost control. In Belgium greater importance is placed on financial responsibility of each fund, rather than on promoting competition. The details of this law were set out in the Royal Decree of August 12, 1994 which brought about the introduction of the current risk equalisation system and prospective financing in 1995. (Schokkaert and Van de Voorde, "Risk adjustment and the fear of markets: the case of Belgium")

Between 1995 and 1997, the risk equalisation was based on the following risk factors: age, sex, household composition, unemployment, income, mortality rate, social group (actives, pensioners, handicapped, widows) and degree of urbanisation. In 1998, work disability status was introduced (Van Doorslaer and Schut, "Belgium and the Netherlands Revisited").

## 4.6 Proposed Changes

As described above, the weighting parameter  $r$  and the financial responsibility level are slowly being increased. In line with this, the risk equalisation mechanism is subject to regular updates and improvements on the basis of yearly advice from two university teams.

It is anticipated that there will be a drastic change and overhaul of the mechanism in the near future on the basis of better quality individual data (as opposed to the aggregate data previously used). (Schokkaert and Van de Voorde, "Belgium: risk adjustment and financial responsibility in a centralised system")

## 5. Colombia

### 5.1 Outline of Health System

Colombian reforms in the early 1990s, in particular Law 100 in 1993, aimed to provide a basic level of health insurance for all individuals, and to enhance efficiency.

For the purpose of health insurance, people are divided into two groups: the Contributory Regime (“régimen contributivo”) and the Subsidised Regime (“régimen subsidiado”).

The Contributory Regime comprises of those who have formal employment, or those who are self-employed (with sufficient income i.e. at least twice the minimum wage) and in 1999 this was 41% of the population. These members have to pay 12% (4% by the employee, 8% by their employer) of their income for health insurance, with 11% being directly spent on their health benefits, and 1% being used to subsidise the poor and low-income population belonging to the Subsidised Regime.

In addition to the payment from the Contributory Regime, the central government also contributes to the Subsidised regime (Bossert et al, “Applied research on decentralization of health systems in Latin America”).

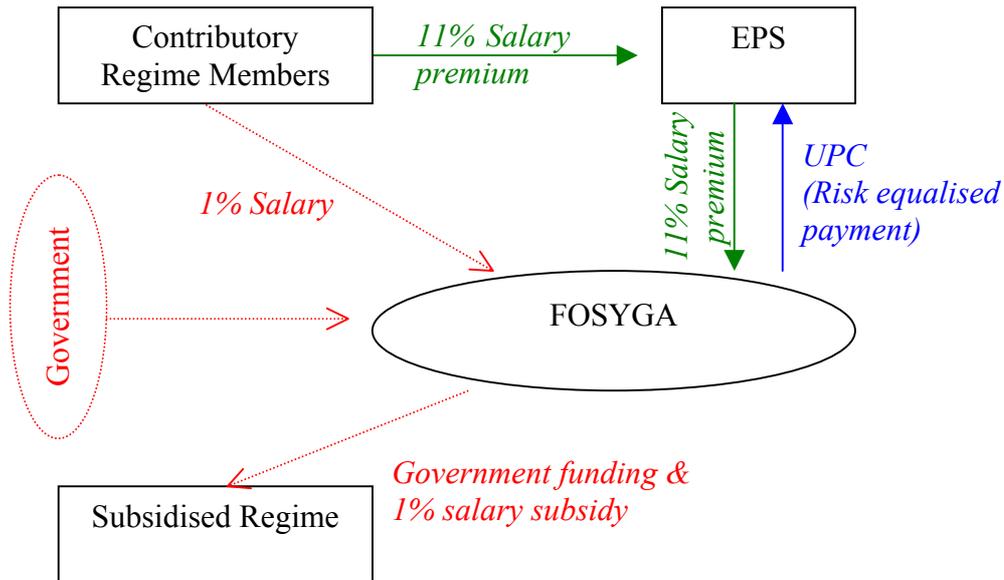
The Contributory Regime members can join private health insurance companies or Health Promoting Organisations (EPS or Entidades Promotoras en Salud), which has to provide a basic benefit package, which is called the POS (Plan Obligatorio de Salud). (Bertranou, “Are market-orientated health insurance reforms possible in Latin-America?”).

Those in the Subsidised Regime can join either an EPS or a public plan (ESS or Empresas Solidarias de Salud), which is essentially an insurance company managed by the relevant local government and specifically designed for this group). The basic benefit package available to this group (known as POSS or Plan Obligatorio de Salud Subsidiado) is less comprehensive than that for the employed group, but it is intended to gradually increase the POSS to the level of the POS by 2001/2002. The insurance funds offering services to the Subsidised Regime are collectively know as Administradoras del Régimen Subsidiados (ARS).

Apart from the basic packages, insurers can offer supplementary insurance for which additional premiums can be levied (Jack , “Health insurance reform in four Latin-American countries”).

### 5.2 Objectives of Risk Equalisation

The risk equalisation mechanism in Colombia aims to provide equal resources to all members, regardless of their ability to pay (González-Rossetti and Ramírez, “Enhancing the political feasibility of health reform”).



**Figure 5.1: Simplified diagram of Colombia's health system**

Source: González-Rossetti A, Ramírez P, “Enhancing the political feasibility of health reform”

### 5.3 The Method Currently Used

The contributions are pooled in the Solidarity and Guarantee Fund (FOSYGA or Fondo de Solidaridad y Garantía). These funds are then allocated to EPSs on the basis of a risk equalisation capitation mechanism (Uthoff A, “Trends in social security reform and the uninsured”) with the following risk factors: age, gender and region. (Yepes , “The Colombian Experience”). This risk-equalised allocation is called the UPC (unidad de pago por capitación).

For age and gender, the following 3 risk categories are defined (Bertranou, “Are market-orientated health insurance reforms possible in Latin-America?”):

- Children under 1 year of age
- Women aged 15 – 44
- All others

### 5.4 Problems with the Current System

According to Bossert (“Privatisation and payments: lessons for Poland from Chile and Colombia”) the risk adjusters of age and sex explain only 3% of the risk, which leaves significant room for cream-skimming. In order to counter this, it is envisaged that “catastrophic illness” will be added in the future

## 6. Czech Republic

### 6.1 Outline of Health System

Emerging from a communist Czechoslovakia, the Czech Republic's reforms in the health sector involved rapid privatisation of the delivery system. The Soviet-styled health system was abolished between 1990 and 1991, which was followed by the creation of the health insurance system in 1992. By 1994, 85% of health care facilities in the Czech Republic were private. (Berman, "National health insurance in Poland: A coach without horses?").

Health insurance is compulsory in the Czech Republic, and is administered by nine independent insurers (down from 27 in the mid-1990s). Premiums for this insurance are income dependent (13.5% in 2000) and are paid by both the employer (9%) and the employee (4.5%), while those who are self-employed pay 13.5% of 35% of profits (subject to a minimum). The ceiling on these premiums is six times the average wage.

The government pays premiums (13.5% of 80% of the minimum wage) for those who do not earn an income (unemployed, pensioners, students, children etc.), which is approximately 53% of the population (Andrews E et al, "Czech Republic human development: social security, education and health").

Each insurer collects these premiums, contracts with providers of health care and reimburses them for any services rendered to its members. Insurers must offer standard benefits (with standard conditions) on the basis of open enrolment. Further, members can change insurer once a year if they so choose.

Health insurers cannot offer supplementary cover. This restriction was the result of the finding in 1997 that many insurers did not have sufficient funds to cover the standard benefits (much less to provide for supplementary ones) which led to a number of insolvencies. Further, insurers cannot operate on a for-profit basis, but instead must set aside any surplus in a 'reserve fund'.

The semi-public General Health Insurance Fund (GHIF/VZP) is the largest insurer (75%) in the Czech Republic, and its solvency is guaranteed by the government. If an insurer becomes bankrupt, then its members are generally transferred to the GHIF. (European Observatory on Health Care Systems, "Health Care Systems in Transition: Czech Republic 2000")

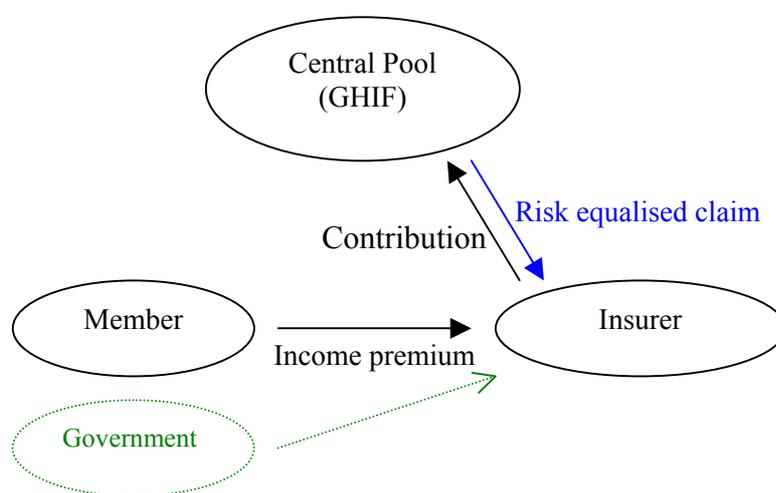
### 6.2 Objectives of Risk Equalisation

The Czech health system is based on solidarity and equality. The risk equalisation mechanism was introduced in order to reduce any incentives to risk select and to compensate those insurers with high risk profiles (European Observatory on Health Care Systems, "Health Care Systems in Transition: Czech Republic 2000").

## 6.3 The Method Currently Used

Insurers are required to pool 60% of premium income, and 100% of government contributions to a central fund which is administered by the GHIF. These funds are then reallocated according the risk equalisation formula whose sole risk factor is age (European Observatory on Health Care Systems, “Health Care Systems in Transition: Czech Republic 2000”).

To achieve this, membership is divided into two groups: those aged 60 and above, and those below. Allocations are determined by giving the older group a weighting of three (i.e. thus an insurer receives three times the amount for a member over 60, than for a member under that age). The calculation is performed once a month (n/e/r/a, “Risk Adjustment and Its Implications for Efficiency and Equity in Health Care Systems”).



**Figure 6.1: Czech Republic’s Risk Equalisation mechanism**

## 6.4 The Calculation

Let:

- $P_i$  be the premiums paid to insurer  $i$  by members
- $G_i$  be the contribution paid by the government to insurer  $i$
- $C_i$  be the contribution to the central fund by insurer  $i$

Then,

$$C_i = 0.6P_i + G_i$$

Let:

- $N_i$  be the total membership for insurer  $i$
- $N_i^*$  be the number of members over the age of 60
- $Y_i$  be the claim for insurer  $i$  from the central fund

Then

$$Y_i = \frac{N_i + 2N_i^*}{\sum N_i + 2\sum N_i^*} \sum C_i$$

Note:  $N_i + 2N_i^* = (N_i - N_i^*) + 3N_i^*$

where:  $N_i - N_i^*$  is the number of members under 60, giving the appropriate weighting.

Then  $Z_i$  gives the net claim for insurer  $i$ :

$$Z_i = Y_i - C_i$$

(n/e/r/a, “Risk Adjustment and Its Implications for Efficiency and Equity in Health Care Systems”).

## 6.5 Problems with the Current System

Clearly the use of only one risk equaliser (age) is insufficient, leaving significant incentives for risk selection, particularly since premiums are income-based (n/e/r/a, “Risk Adjustment and Its Implications for Efficiency and Equity in Health Care Systems”).

Further, the smaller insurers generally have members with higher incomes, and thus receive more premiums (since these are income based). Since only 60% of this is pooled, these smaller insurers get larger revenues per capita (European Observatory on Health Care Systems, “Health Care Systems in Transition: Czech Republic 2000”).

## 6.6 The Evolution of Risk Equalisation

The Czech Republic’s current health system served as a replacement of the Soviet-style health model, and as such is still fairly young. So too is risk equalisation, which has not seen any major changes since its original implementation. One change to the system was to increase the percentage of premium income pooled from 50% to 60% to decrease the incentives to risk select on income (n/e/r/a, “Risk Adjustment and Its Implications for Efficiency and Equity in Health Care Systems”).

However, a new risk equalisation mechanism has been proposed and is currently under debate. This proposal suggests that 100% of premiums are pooled and then reallocated on the basis of age and sex (in 16 groups) (European Observatory on Health Care Systems, “Health Care Systems in Transition: Czech Republic 2000”).

## 7. Germany

### 7.1 Outline of Health System

Health services are financed mainly through social health insurance, with a mix of both public and private providers. Public health services are coordinated by the Federal and Länder (state) governments and the local authorities.

Approximately 90% of the German population is covered by statutory health insurance which is administered by corporate organisations (i.e. non-governmental) and supervised by the government. This insurance is funded through premiums paid by the members and their employers (each pays half).

These premiums, which are paid directly to the relevant sickness fund, are calculated as a percentage of the member's income (to an upper limit), with no regard to age, sex and health status. The system thus provides a form community rating although the percentage charged can vary between different insurers. Further, the member's dependents are automatically covered with no extra charge. (Federal Ministry for Health, "Health Care in Germany")

It is compulsory for employees who earn under a certain income level to have statutory health insurance (Gesetzliche Krankenversicherung, GKV). Self-employed people and those earning over a certain income (in 2000 this was 6450 DM per month in the West and 5325 DM in the East), have the choice to insure themselves privately, or can *voluntarily* join a statutory health fund (Krankenkassen). There are over 400 such funds.

Private health insurance funds offer benefits that are similar to those offered by the statutory funds, and cover about 8% of the population (Kunz R, Pientka L, "Role of Evidence-based Guidelines in Managed Care Pilot Projects in Germany"). By law they have to provide a standard, community rated package with open enrolment but for any other package they can risk rate on a "lifetime basis" which means that once accepted at a certain premium level, that level cannot be increased other than for medical inflation.

According to the Health Reform 2000 statute, members over 55 who are privately insured cannot return to a statutory health insurance, even if their income decreases (Jost, "Private or public approaches to insuring the uninsured").

The statutory funds also cover students and the unemployed. The statutory health funds largely contract with independent doctors and dentists to provide outpatient services to the public (Takis, "Country Profile of Germany").

Until 1995 most people were assigned by law to a health insurance fund. The allocation often depended on the member's employer, profession or geographical region. This led to greatly varying income and risk profiles for different funds and as a result, varying premium levels.

In 1996 the Health Care Structure Act overhauled this system. Almost all insured members were granted the right to choose their own health fund, and thereafter change to a new fund on a yearly basis, provided three month's notice was given. Further, it established open enrolment, whereby funds, with the exception of certain company or industry-based funds, were obliged to accept any applicant (European Observatory on Health Care Systems, "Health Care Systems in Transition: Germany 2000").

Health services in Germany are separated into two distinct categories: ambulatory care and inpatient care (Kunz and Pientka, "Role of Evidence-based Guidelines in Managed Care Pilot Projects in Germany").

## **7.2 Objectives of Risk Equalisation**

The old health care system encouraged selection by health risk as well as income, leading to growing premium differences between sickness funds (whose membership was often based on employment & hence income). The introduction of the risk equalisation mechanism therefore aimed to achieve goal of solidarity (n/e/r/a, "Risk-Adjustment and Its Implications for Efficiency and Equity in Health Care Systems").

Further, the German government introduced measures to promote competition and consumer freedom, thus increasing the incentives to risk select. Risk equalisation also aims to counter these incentives (Oliver, "Risk adjusting health care resource allocations") and give all health funds an equal chance to compete (European Observatory on Health Care Systems, "Health Care Systems in Transition: Germany 2000").

## **7.3 The Method Currently Used**

The risk equalisation scheme in Germany is administered by the Federal Insurance Office (Bundesversicherungsamt). It is a retrospective mechanism, with calculations being performed once a year and by law, all health funds have to participate in the scheme (n/e/r/a, "Risk-Adjustment and Its Implications for Efficiency and Equity in Health Care Systems").

Equalisation is based on the following risk factors:

- Age
- Gender
- Disability
- income.

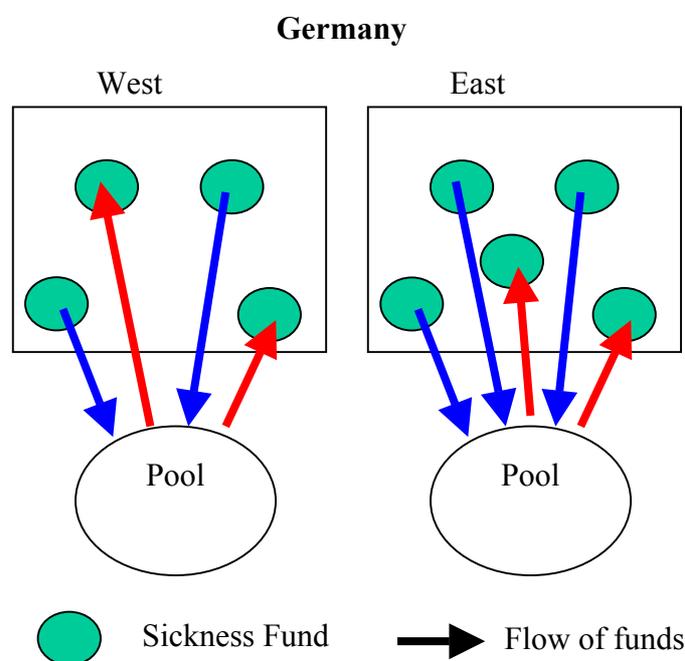
This is an attempt to equalise the differences in premiums received due to differences in income (on which premiums are based), and expenditure (which is affected by age and gender). It should be noted that the number of dependants is also indirectly equalised, since they gain automatic insurance (Oliver, "Risk adjusting health care resource allocations").

For the purpose of risk equalisation, Germany is divided into two regions, namely the former West and East Germany due to the differences in costs in delivering health care in these regions, as well as the income levels. Berlin (as a whole) is allotted to Western Germany (n/e/r/a, “Risk-Adjustment and Its Implications for Efficiency and Equity in Health Care Systems”).

The two systems will be completely integrated when the average income level in the East is 90% of that in the West. As a step toward this, in January 1999 the equalisation for income risk factor was performed for Germany as a whole. Other than this division, regional variations in health costs are not equalised (Oliver, “Risk adjusting health care resource allocations”).

One of the notable affects of the risk equalisation scheme is the level of premiums. In 1994, 27% of all members paid a premium rate differing by more than one percent from the average, whilst in 1999 this had dropped to 7%.

Further, movement between funds has largely been by young, healthy members with higher incomes, who seek cheaper funds. The result of this is increased equalisation transfers between funds. Data from the Federal Ministry for Health, and calculations by the European Observatory on Health Care Systems, indicate that transfers increased from 7.9% of expenditure in 1995, to 9.2% of expenditure in 1998. This indicates that the risk equalisation scheme is not a temporary measure, but rather something that will be a permanent feature of the health system (European Observatory on Health Care Systems, “Health Care Systems in Transition: Germany 2000”).



**Figure 7.1: Flow of Funds in Germany’s bi-regional risk equalisation**

## 7.4 The Calculation

The risk groups into which members are divided are determined by age, gender, number of dependants, and disability.

Let:

$Z_i$  be the income level for insurer  $i$  (which its members are liable to pay through premiums). This is calculated by Federal Insurance Office.

$C(k)$  be the *national* per capita costs for risk group  $k$  (using actual data). This is used as the reference cost.

$n_i(k)$  the number of members in risk group  $k$  for insurer  $i$ .

Then,

$$E_i(k) = n_i(k).C(k) \quad \text{(Standardised Health Care Expenditure)}$$

Where  $E_i(k)$  is the *standardised health care expenditures* for risk group  $k$  (for insurer  $i$ ).

The summation of this standardised expenditure over all risk groups for a particular insurer, gives that insurer's *premium requirement* ( $P_i$ ):

$$P_i = \sum_k E_i(k) \quad \text{(Premium Requirement)}$$

The “equalisation rate” ( $\alpha$ ) is then determined:

$$\alpha = \frac{\sum_i A_i}{\sum_i Z_i} \quad \text{(Equalisation Rate)}$$

This equalisation rate ( $\alpha$ ) can in turn be used to calculate each insurer's “financial strength” ( $F_i$ ) where  $F_i = \alpha.Z_i$ .

This is then compared to the insurer's premium requirement ( $P_i$ ) to determine whether the insurer is a net contributor to, or a net recipient of the risk-equalised funds (European Observatory on Health Care Systems, “Health Care Systems in Transition: Germany 2000”).

Those whose financial strength is *greater* than the premium requirement, are net contributors, and vice versa. Thus,

$$F_i > A_i \Rightarrow \text{Net Contribution to risk equalisation pool}$$

$$F_i < A_i \Rightarrow \text{Net Receipt from risk equalisation pool}$$

Consider the following simple example with two insurers 1 and 2 with the following data:

|                               | Insurer 1 | Insurer 2 |
|-------------------------------|-----------|-----------|
| Income ( $Z_i$ )              | DM 600 bn | DM 400bn  |
| Premium Requirement ( $P_i$ ) | 55 bn     | 35 bn     |

Then,  $\alpha = (55 + 35) / (600 + 300) = 0.090$

$$\therefore F_1 = 0.09(600\text{bn}) = 54 \text{ bn}$$

$$\therefore F_2 = 0.09(400\text{bn}) = 36 \text{ bn}$$

Thus for Insurer 1, its premium requirement ( $P_1$ ) exceeds its financial strength ( $F_1$ ) by 1 billion DM. Insurer 2's financial strength ( $F_2$ ) exceeds its premium requirement  $P_2$  by 1 billion DM. Insurer 1 will therefore be a net recipient of the difference, with Insurer 2 being the net contributor (Oliver, "Risk adjusting health care resource allocations").

## 7.5 Problems with the Current System

Due to the fact that the use of direct health risk factors is limited to disability, the current process does not eliminate all incentives to risk select. There is thus a strong case for including more risk factors in the equalisation mechanism (Oliver, "Risk adjusting health care resource allocations").

## 7.6 The Evolution of Risk Equalisation

The concept of risk equalisation was officially introduced by the Health Care Reform Act in December 1992 (Gesundheitsstrukturgesetz). In October 1993, provision was made for the introduction of a risk equalisation scheme and its technical details were established in a federal risk equalisation decree (Risikoausgleichsverordnung – RSAV). This came into affect on 1 January 1994 and was compulsory for all insurance fund members, except pensioners, who were integrated into the system a year later in January 1995.

Risk adjustment was initially done on a monthly basis with 5-year age bands (with the exception of the first category – age 0 to 14, and the last – age 80 and over). Problem with monthly basis – data often not sufficient, since Federal Insurance Office's data (on which it based it's parameters for the calculation) were out of date.

(n/e/r/a, "Risk-Adjustment and Its Implications for Efficiency and Equity in Health Care Systems")

## 8. Ireland

### 8.1 Outline of Health System

The Irish health system consists of a mix of both public and private care. The two play a complementary role, with the private sector supporting the public sector in providing healthcare for the population.

The public health system is funded mainly through taxation, thus giving all citizens the right to certain services (including public hospital in-patient services). These services are administered by 8 regional health boards (which act under the Department of Health and Children).

There are two categories of eligibility for public health services:

1. Those who are unable to obtain health services on their own initiative, without causing undue hardship. This is means-tested and based on income and other personal circumstances. These people are entitled to full health services (including GPs, various levels of primary care including hospitalisation, prescription drugs, out-patient care, and maternity care). Medical cards are issued to these people to prevent abuse.
2. Those not falling into category 1 have to pay a levy for each day of hospitalisation. Other hospital services are free, with a refund on prescription drugs (if consumption exceeds a certain level). GP services and other primary care must be funded privately.

While the government recognises that conflict may arise in pursuing policies of both solidarity and competition in the private health system, they believe that an unrestricted market would not offer sufficient protection to the “vulnerable in society, seeking access to a social good like healthcare.” (Department of Health and Children (Ireland), “White Paper on Health Insurance”)

Prior to July 1994, there was effectively a monopoly in private health insurance, with the Voluntary Health Insurance Board (VHI) being protected by the government. About 10 small schemes co-existed during this time, but were not in competition with VHI, instead offering supplementary health insurance.

To satisfy the requirements of the European Union (The Third Non-life Insurance Directive), the Irish market was opened up to all health insurers in other EU states. It was at this stage that BUPA Ireland Limited, a subsidiary of The British United Provident Association Limited (a mutual health insurer operating in several countries), was formed.

The Irish market thus consists of two private health insurers: VHI (which is now semi-state owned, with view to fully privatise) and BUPA, with approximately 42% of the population having private health cover in 1999 (Department of Health and Children (Ireland), “White Paper on Health Insurance”).

In order to make private health insurance more attractive (so as to reduce the burden on the public system – there are waiting lists for treatment), the government created a number of incentives, such as tax relief on health insurance premiums, setting public hospital charges (for services to private patients) at below economic cost (effectively subsidising insurers), and the absorption of costs relating to emergency services, by the public system. (Department of Health and Children (Ireland), “White Paper on Health Insurance”)

The Irish private health insurance market is operated on the basis of three principles:

- Community Rating,
- Open Enrolment
- Lifetime Cover.

Under community rating, health schemes have to charge level premiums, regardless of gender, age or health status. The Health Insurance (Amendment) Bill 2000 saw the introduction of lifetime community rating, which gives insurers the ability to impose at their discretion, late entry loadings on premiums for people who take out health insurance for the first time after the age of 35. (Department of Health and children (Ireland), “Health Insurance (Amendment) Bill 2000”)

The late entry premium loadings are as follows:

**Table 8-1: Entry Premium Loadings for Ireland**

| <b>Age at joining</b> | <b>Maximum Premium Loading</b> |
|-----------------------|--------------------------------|
| Under 35              | 0%                             |
| 35 – 44               | 10%                            |
| 45 – 54               | 25%                            |
| 55 – 64               | 45%                            |
| 65+                   | 80%                            |

*(Source: Department of Health, “White Paper on Health Insurance”)*

These loadings can also be charged if a member increases their level of cover. Further, a member may cancel their current private health cover temporarily, and will still be credited for the cover held. On rejoining a scheme, their age at entry will be taken to be their *current age* less the number of years for which they previously had health cover. (Department of Health and Children (Ireland), “White Paper on Health Insurance”)

There is a further degree of flexibility in the community rating where premiums can be set at different levels:

- Premiums for children under the age of 18 cannot exceed 50% of the premium for adults with the same level of coverage
- Premiums for students who are between the ages of 18 and 23, in full time education and are dependents, must not be more than 50% of the premium for adults with the same level of coverage
- Discounts of up to 10% can be given on premiums for group schemes
- Long-term care insurance is excluded (i.e. insurance relating to nursing or institutional care of those over 65 years, or chronic illness and disability).

(Department of Health and Children, “Health Insurance (Amendment) Bill 2000”)

Apart from community rating, schemes must practice open enrolment, whereby they accept any applicant regardless of age or other risk characteristics. Further, once a person is enrolled, the renewal of their health cover is guaranteed, and may not be cancelled by the insurer, thus effectively providing lifetime cover.

To protect insurers, the open enrolment regulations allow them to impose a waiting period of up to 26 weeks from the date of first enrolment. For maternity benefits and those over the age of 55, this is extended to a maximum of 52 weeks.

Should a member suffer from pre-existing conditions, the insurer may impose further waiting periods:

**Table 8-2: Waiting periods**

| Age at enrolment | Waiting period |
|------------------|----------------|
| Under 55         | 5 Years        |
| 55 – 59          | 7 Years        |
| 60 – 64          | 10 years       |

*(Source: Advisory Group, “Report on the Risk Equalisation Scheme”)*

Further, in the case of benefit increases, the insurer does not have to pay the higher level of benefits for a period of two years following the increase.

The regulations also allow a person who has cancelled their health cover (for any reason) to effect cover in respect of the same services previously held, with any health insurer, within 13 weeks of cessation of that cover. Thus, insurers have to accept any person who wishes to transfer from one insurer to another, without penalty. (Advisory Group to the Minister for Health, “Report of the Advisory Group on the Risk Equalisation Scheme”)

A measure to support community rating, apart from risk equalisation, is a statutory minimum schedule of benefits for hospital in-patient services. This is largely to prevent “Swiss cheese” policies, whereby insurers could offer health schemes with restricted cover at lower premiums to attract low risk lives. This could destabilise community rating. The minimum benefits package covered is semi-private accommodation in a public hospital. (HCWP, “Private Health Insurance in Ireland: Challenging Times”).

## 8.2 Objectives of Risk Equalisation

The Advisory Group (“Report of the Advisory Group on the Risk Equalisation Scheme,”) was of the opinion that risk equalisation is a necessity in the Irish private health insurance market in order to preserve community rating and to facilitate competition in such an environment.

Without risk equalisation, health insurers would be able to target low-risk people, and thus charge lower community rated premiums than competitors.

Community rating and open enrolment does not prevent insurers from pursuing such activities, since lower risk profiles can be achieved through selective marketing, benefit design, or selective quality of service. This, in a community rated environment, could lead to market instability and a loss of public confidence. (Department of Health and Children (Ireland), “White Paper on Health Insurance”).

This in turn would see large numbers of low risk members ceasing their private cover, turning to the public system, and as a result leaving a smaller private health market, with a higher risk profile. (HCWP, “Private Health Insurance in Ireland: Challenging Times”).

Further, risk selection does not improve efficiency. In the long term, it would be more beneficial if investment were directed toward the reduction of claims costs and the improvement of service, rather than on attempts to attract better risks.

The objectives officially stated by Government in its “White Paper on Health Insurance (1999)” are:

- a) To preserve the stability of community rating in a competitive environment;
- b) Subject to a), to facilitate competition in the Irish health insurance market;
- c) to satisfy the ‘general good’ principles underlying the EU’s Third Non-Life Directive;
- d) to be self-financing; and to meet as far as possible, the following criteria:

### 1. Equalisation of Risk Profiles

The scheme should provide a stable environment for community rating/open enrolment, through eliminating incentives for health insurers to select preferred risks, by ensuring that each health insurer bears the cost of a risk profile equivalent to the risk profile of all insured lives;

## 2. Equity

The Scheme should be perceived to be equitable between health insurers and should not result in any health insurer having to share profits which it has made as a result of its own efficiencies and cost controls;

## 3. Cost Containment

The scheme should not present disincentives to health insurers to maximise efficiency and control costs;

## 4. Non-Equalisation of Benefit Levels

The scheme should not equalise different levels of benefit paid by different health insurance plans;

## 5. Practicality

The scheme should be understandable and practical to operate;

## 6. Predictability

The scheme should produce results which are as predictable as possible, to allow health insurers to cost their policies appropriately.

(Department of Health and Children (Ireland), “White Paper on Health Insurance”).

## 8.3 The Method Currently Used

The health industry in Ireland is in a state of flux. As such, the government is implementing an Interim Risk Equalisation Scheme, which is anticipated to be replaced in June 2002 by an “Amended Scheme”. These two schemes will be dealt with in the following two sections: 8.3.1 and 8.3.2 respectively.

The Amended Scheme could not be implemented immediately due to its data requirements and the lack of reporting systems to support it. While the necessary systems are being developed, the Interim Measure will be used.

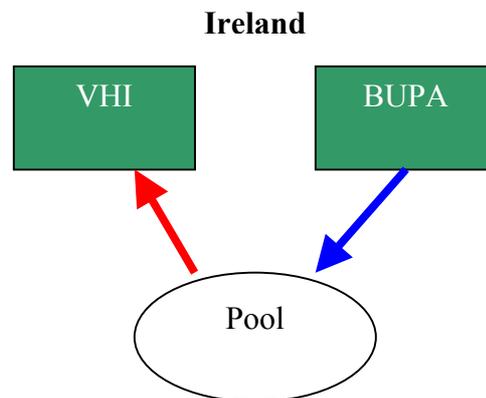
It should be noted that **no actual risk equalisation is currently taking place** between the two health insurers. However, the calculations are still performed every quarter and the scheme will come into affect when certain “trigger requirements” are met. (Department of Health and Children (Ireland), “White Paper on Health Insurance”). In the event that either:

- The total of payments made by all insurers exceeds 2% of the total equalised benefits for the market, or
- The amount that would have been payable to any one insurer exceeds 2.5% of its equalised benefits (subject to it being greater than £125 000) and the insurer’s equalised benefits exceeds 5% of the total market’s equalised benefits

is observed in two successive quarters, then the risk equalisation scheme would come into affect in the following quarter. (Advisory Group, “Report of the Advisory Group on the Risk Equalisation Scheme)

The risk equalisation process is to be administered by the Health Insurance Authority (HIA), which is soon to be established.

The risk equalisation methodology aims to replace each insurer's *actual claims* by what they would have experienced had their distribution of policyholders (with respect to the risk factors) been exactly the same as the same as that of the total insured population. (HCWP, "Private Health Insurance in Ireland: Challenging Times"). This approach is known as the Utilisation Adjusted Risk Profile Method. This method is the basis for both the Interim and Amended Schemes.



**Figure 8.1: Potential Flow of funds in Ireland**

Figure 8.1 above indicates the potential flow of funds in the Irish system. As membership currently stands, BUPA would have to make payments to VHI. This might change in the future as membership proportions change, and as other health insurers enter the market.

Both schemes are retrospective, with equalisation set to occur quarterly. As such, insurers are required to submit the relevant data at the end of each quarter. Payments to or from the risk equalisation pool, in respect of any particular quarter, would be spread over a year, with 25% of the payment made immediately, and a further 25% paid in each of the following three quarters. Overdue payments will be subject to interest of 15% per annum. (HCWP, "Private Health Insurance in Ireland: Challenging Times").

In order to promote competition in the health market, new health insurers have the option not to partake in the risk equalisation scheme for three years after the commencement of business in Ireland. (Department of Health and children (Ireland), "Health Insurance (Amendment) Bill 2000")

### **8.3.1 The Interim Risk Equalisation Scheme**

In the Interim Scheme, three basic categories of risk adjusters are used:

- Age
- Gender
- Utilisation.

Utilisation is used as a proxy for health status factors that are not easily identified or measured. Utilisation is measured by the number of “bed nights” of hospitalisation. Each day case is classified as a one night in-patient stay.

To create incentives to promote efficiency and minimise costs, the utilisation measure adopted is an average of the insurer’s own “bed night” experience, and that of the market experience.

The proportion of a claim that can be claimed against the risk equalisation pool is given by:

**Table 8-3: Claims against the risk equalisation pool**

| <b>Benefit Category</b>                    | <b>Maximum Prescribed Equalised Benefit</b> |
|--|---|
| Public hospital per diem rate              | Full Charges                                |
| Private Hospital per diem rate             | £250 or the actual charge if lesser         |
| Private Psychiatric hospital per diem rate | £100  |
| Fixed price procedures                     | 90% of the schedule procedure price         |
| Consultant Fees                            | 90% of the schedule procedure price         |

*(Source: Department of Health, “White Paper on Health Insurance”)*

### **8.3.2 The Amended Risk Equalisation Scheme**

The Amended Scheme is a modification of the Interim Scheme, and replaces the crude “Bed Night” measure by a more complex utilisation measure (while still retaining age and gender). The choice of utilisation measure largely determines the scale of transfers between health insurers, and as such, the measure should aim to discourage risk selection, but at the same time, encourage cost efficiency.

To achieve this, Diagnosis Related Groups (DRG) data will be used to create the foundation for the utilisation measure. DRGs are a casemix based classification system, which groups hospital patients according to their diagnosis, method of treatment and various other criteria. Irish hospitals currently make use of such a system in service planning and budgeting.

One of the roles of the Health Insurance Authority (HIA) is to draw up a list of certain diagnoses (called “Specified Diagnoses”). The diagnoses in this category are intended to be resource-intensive conditions, which in almost all cases require hospital treatment. Through the list, the Amended Scheme aims to equalise only such diagnoses. This is a measure to avoid a failing of many utilisation systems, which relate only to in-patient hospital care, thereby creating incentives to avoid out-of-hospital care. Further, such systems do not reward prevention.

Initially it is envisaged that the list will contain those diagnoses with a “resource intensity” greater than the median. This list will be reviewed at various intervals, with input from health professionals.

For each Specified Diagnosis, a “resource intensity factor” will be calculated. The HIA intends to base these factors initially on international research and experience, and thereafter adapt them to more appropriately reflect the Irish experience. This “resource intensity factor” will be used to determine the Casemix Index as follows:

$$\text{Casemix Index} = \sum (\text{number of cases under each specified diagnosis } k) \times (\text{intensity factor for } k)$$

These Casemix Index scores will then be equalised within each age/ gender category.

The benefits under the Amended Scheme will be the same as that for the interim scheme, but will be re-evaluated (and adjusted if necessary) at intervals to keep in line with price changes.

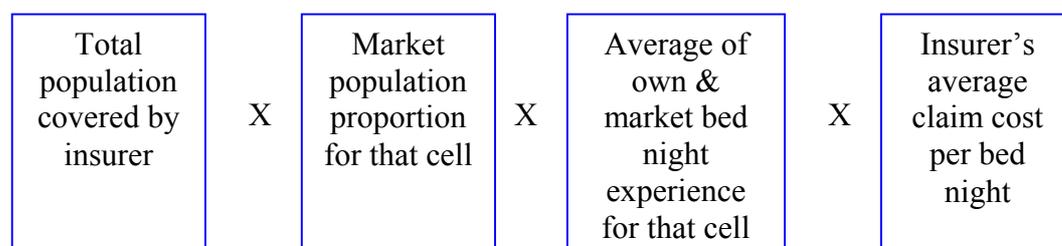
(Department of Health and Children (Ireland), “White Paper on Health Insurance”).

## 8.4 The Calculation

### 8.4.1 Interim Scheme Calculation

The following diagram represents the claims cost that an insurer will emerge with after the transfer of funds to or from the risk equalisation pool (i.e. either a receipt of funds, or a payment thereof):

The sum over all age and gender cells of:



(Source: Department of Health, “White Paper on Health Insurance”)

To develop this algebraically the following symbols are defined:

- Let  $n$  = a specified age group  
 $x$  = gender  
 $P_i$  = the fully insured population at the *start* of the quarter for insurer  $i$   
 $A_i$  = a membership value for insurer  $i$  at the *start* of the quarter  
 $= \frac{\text{adult lives (over 18) + child lives/3}}{P_i}$

This takes into account the fact that insurers can charge much lower premiums for children under 18, as according to the rules of community rating described above.

- M = value for the market as a whole, corresponding to  $A_i$  above
- $\beta_{n,x}$  = the proportion (of the insured population in the whole market) in age group  $n$  and gender  $x$  at the start of the quarter
- BNR<sub>i</sub> = Bed Night Rate for insurer  $i$   
 =  $\frac{\text{Total Bed Nights for Insurer } i \text{ for quarter}}{P_i}$
- (Where each day case is classified as a 1 night in-patient stay.)*
- BNR<sub>M</sub> = Bed Night Rate for Market
- $U_{n,x}^i$  = Utilisation Measure based on Bed Night Rate  
 =  $\frac{\text{BNR}_i + \text{BNR}_M}{2}$
- $\alpha_{n,x}^i$  = aggregate of equalised benefits paid by insurer  $i$  for the age/ gender category  $(n,x)$ , *divided* by the Total Bed Nights during the quarter for insurer  $i$ .

The claims cost for insurer  $i$  is thus:

$$= \frac{A_i}{M} P_i \sum^{n,x} \beta_{n,x} U_{n,x}^i \alpha_{n,x}^i$$

When this is applied to the overall market, this will not necessarily give rise to a zero sum. To enable this, so as to make the system self-financing, the costs are adjusted with a correction factor.

$$\frac{\alpha^M}{K^M}$$

Where:

- $\alpha^M$  = aggregate of equalised benefits paid over the entire market
- $K^M$  = aggregate of post-equalisation claims cost for the entire market, based on the above formula.

If there exists a very low incidence of bed nights in a certain age-gender cell, there might be statistical distortions. Thus, if there are less than 20 in an age-gender cell, the corresponding market average equalised bed night cost will be substituted for the insurer's own experience.

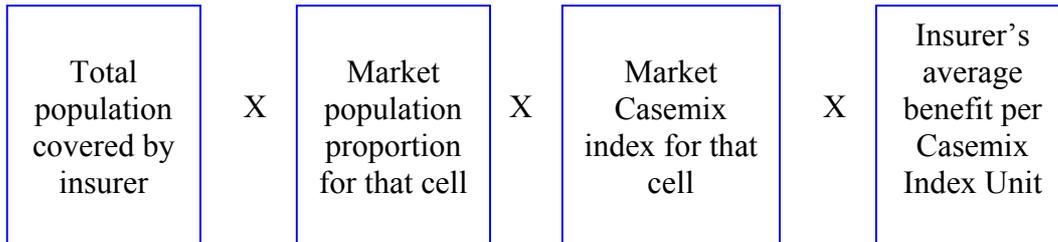
(Department of Health and Children (Ireland), "White Paper on Health Insurance").

### 8.4.2 Amended Scheme Calculation

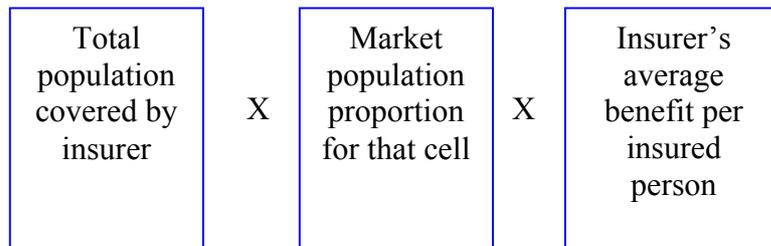
The diagram below represents the claims cost that an insurer will emerge with after the transfer of funds to or from the risk equalisation pool (i.e. either a receipt of funds, or a payment thereof):

The sum over all age and gender cells of:

*For benefits paid in respect of Specified Diagnoses:*



*For benefits paid other than in respect of Specified Diagnoses:*



(Source: Department of Health, "White Paper on Health Insurance")

Again the necessary parameters are defined:

- Let  $n$  = a specified age group
- $x$  = gender
- $P_i$  = the fully insured population at the *start* of the quarter for insurer  $i$
- $A_i$  = a membership value for insurer  $i$  at the *start* of the quarter
- =  $\frac{\text{adult lives (over 18) + child lives}/3}{P_i}$

This takes into account the fact that insurers can charge much lower premiums for children under 18, as according to the rules of community rating described above.

- $M$  = value for the market as a whole, corresponding to  $A_i$  above
- $\beta_{n,x}$  = the proportion (of the insured population in the whole market) in age group  $n$  and of gender  $x$  at the start of the quarter

- $P_{x,n}$  = the number of insured members (of the total market) in age/ gender cell (n,x)  
 =  $\beta_{n,x} \left( \sum_j P_j \right)$
- $\mathcal{G}_{n,x}^i$  = the total of equalised benefits paid in the quarter, by insurer i in respect of non Specified Diagnoses for age/ gender cell (n,x) *divided* by  $P_i$  (insurer's fully insured population for cell at start of quarter).
- $C_{n,x}^i$  = The Casemix Index for insurer i, in respect of Specified Diagnoses, for the age/ gender cell (n,x).
- $C_{n,x}^M$  = The Casemix Index for the Market, in respect of Specified Diagnoses, for the age/ gender cell (n,x).
- $\lambda_{n,x}$  = the market average Casemix Index Rate (in respect of Specified Diagnoses for an age/ gender cell)  
 =  $\frac{C_{n,x}^M}{P_{x,n}}$
- $\Psi_{n,x}^i$  = the total of the equalised benefits paid by insurer i (during the quarter and in respect of Specified Diagnoses) for the age/ gender cell (n,x) *divided* by  $C_{n,x}^i$  (insurer's own Casemix Index)

The claims cost for insurer i is thus:

$$\frac{Ai}{M} P_i \sum^{n,x} \beta_{n,x} (\mathcal{G}_{n,x}^i + \lambda_{n,x} \Psi_{n,x}^i)$$

When this is applied to the overall market, this will not necessarily give rise to a zero sum. To enable this, so as to make the system self-financing, the costs are adjusted with a correction factor.

$$\frac{\alpha^M}{K^M}$$

Where:

- $\alpha^M$  = aggregate of equalised benefits paid over the entire market  
 $K^M$  = aggregate of post-equalisation claims cost for the entire market, based on the above formula.

(Department of Health and Children (Ireland), "White Paper on Health Insurance").

## 8.5 Problems with the Current System

The system of risk equalisation does not encourage cost control since allocation is based on direct utilisation. Further, reporting requirements are complex and the benefit limits for purposes of risk equalisation are closely tied to VHI plan design (Society of Actuaries in Ireland, “Submission to the Minister for Health and Children on Private Health Insurance”).

In addition to this, VHI is semi-state owned (although there are moves to privatise it completely) and it has been suggested that there are conflicts of interest. This is particularly pertinent when it is considered that VHI has some 1.6 million members, compared to BUPA’s 160 000.

## 8.6 The Evolution of Risk Equalisation

Provision for a risk equalisation scheme was first introduced by the Health Insurance Act of 1994 (Ireland, 30 June 1994). Draft health insurance regulations were subsequently published in March 1995 detailing a proposed risk equalisation scheme, which was officially established in regulations in 1996. (Advisory Group, “Report of the Advisory Group on the Risk Equalisation Scheme”)

The original scheme, as with its successors, was retrospective, with payments each quarter. Risk adjusters used were age, gender and length of stay which serves as a simple proxy measure of “case mix”. The calculation of payments was as follows:

Let  $n$  = a specified age group  
 $x$  = gender  
 $P_i$  = the fully insured population at the *start* of the quarter for insurer  $i$   
 $A_i$  = a membership value for insurer  $i$  at the *start* of the quarter  
=  $\frac{\text{adult lives (over 18) + child lives/3}}{P_i}$

This takes into account the fact that insurers can charge much lower premiums for children under 18, as according to the rules of community rating described above.

$M$  = value for the market as a whole, corresponding to  $A_i$  above  
=  $\sum_j A_j$

$\beta_{n,x}^i$  = proportion of members in age/ gender category  $(n,x)$  for insurer  $i$

$\beta_{n,x}$  = the proportion (of the insured population in the whole market) in age group  $n$  and of gender  $x$  at the start of the quarter

A “weighted claim value” is calculated in respect of each claim based on the following table:

**Table 8-4: Weighted claim values**

| Length of stay<br>(number of in-patient<br>days) | Weighted Claim<br>Value |
|--|-------------------------|
| 1  | 0.2                     |
| 2  | 0.3                     |
| 3  | 0.4                     |
| 4  | 0.5                     |
| 5 or more  | 1.0                     |
| Day Patient Claim                                | 0.1                     |

(Source: HCWP, “Private Health Insurance in Ireland: Challenging Times”)

This served as a proxy for Diagnosis Related Group data.

- $W_{n,x}^i$  = the total weighted claim value for insurer i, divided by the number of members in age/ gender category (n,x) for insurer i
- $W_{n,x}^M$  = the total weighted claim value divided by the total number of insured lives in age/ gender category (n,x) for all insurers
- $CC_{n,x}^i$  = the average cost per weighted claim value for insurer i in age/ gender category (n,x)

If the total weighted claim value for insurer i is less than 10, then  $CC_{n,x}^i$  is set to the average cost per weighted claim value experienced by all insurers.

The first step is to decompose the overall claims cost for insurer i:

$$TC_i = P_i \sum_{n,x} \beta_{n,x}^i \left( \sum_{\text{all } w} W_{n,x}^i \cdot CC_{n,x}^i \right)$$

The next step is to calculate the Post Equalisation Claims Cost (PECC) for insurer i:

$$PECC_i = P_i \sum_{n,x} \beta_{n,x} \left( \sum_{\text{all } w} W_{n,x}^i \cdot CC_{n,x}^i \right)$$

In order to ensure that the system is self-financing, and that payments sum to zero, the PECC needs to be adjusted:

$$PECC_i \times \frac{\sum_i TC_i}{\sum_i PECC_i}$$

The final step to calculate the payment from, or contribution to the pool is to subtract the insurer's actual costs from the adjusted PECC:

$$\text{Contribution} = PECC_i \times \frac{\sum_i TC_i}{\sum_i PECC_i} - TC_i$$

(HCWP, "Private Health Insurance in Ireland: Challenging Times")

Following this, in 1997, the Advisory Group on the Risk Equalisation Scheme was established, whose task was to perform a review of the system which was published in April 1998. On the basis of this, the Minister of Health decided in December 1998 not to proceed with the risk equalisation in the form established by the 1996 regulations (as described above).

The Health Insurance (Amendment) Bill 2000 set about to reform the risk equalisation system, giving rise to the Interim and Amended Schemes. The government's intentions were to amend the risk equalisation method to create an improved balance between encouraging competition and protecting against "cream skimming."  
(Department of Health and Children (Ireland), "White Paper on Health Insurance")

## 9. Israel

### 9.1 Outline of Health System

The Ministry of Health is responsible for all health services in Israel. Under the National Health Insurance (NHI) Law (January 1995), all residents in Israel have compulsory basic health insurance with one of the four competing non-profit sickness funds, which provide a standardised basket of medical services, including hospitalisation (See Appendix D).

The law provides for community rating and open enrolment for this basic insurance, and insurers cannot discriminate on any basis, including age and health status.

The compulsory insurance is largely financed (48% in 1999) through income-dependent health insurance premiums, which are paid directly to the National Insurance Institute (NII). In addition to this, there is a parallel taxation that requires employers to pay a percentage of a member's salary (This is currently 3.1% of the salary which is equal to half of the average salary, and 4.8% of the rest of the salary, up to four times the average salary). Those who are self-employed are also required to pay this tax. Pensioners pay a total premium equivalent to 2% of the average wage. Approximately 5% of the health costs are funded through co-payments (Shmueli et al, "Risk adjustment and risk sharing: the Israeli experience").

Supplementary insurance is available to cover services not covered by the compulsory basic insurance and is offered by both the private insurers and the sickness funds. Premiums for such insurance are community rated and are thus the same for all members of a particular insurer. The only exception to this is nursing services, which can be risk rated according to age (Ministry of Foreign Affairs (MFA - Israel), "National Health Insurance").

Members have the right to choose which health insurer to use, and if they have been registered with a particular insurer for at least a year, can change (WHO, "Highlights on health in Israel).

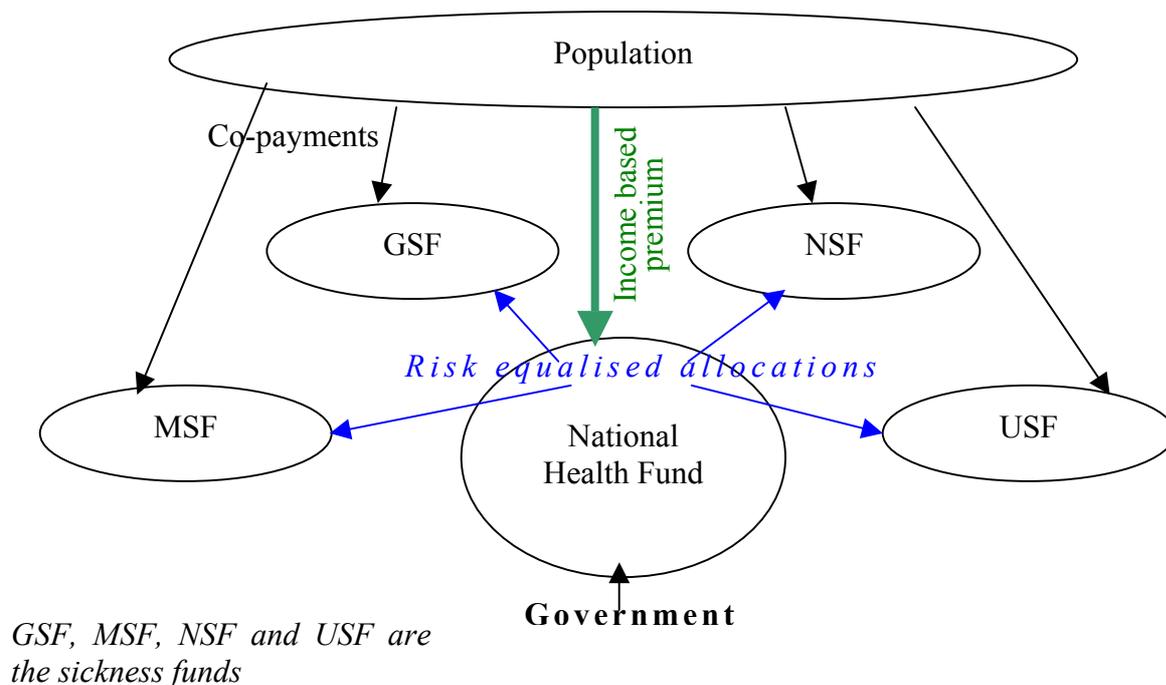
### 9.2 Objectives of Risk Equalisation

By the end of 1994, approximately 12% of the General Sick Fund's (GSF) membership was over the age of 65 while the Maccabi and Meuhedet sickness funds had only 6% and 5% respectively in this group. GSF, which at that stage covered about two-thirds of the population, was experiencing financial instability with large accumulated deficits.

The introduction of the risk equalisation formula thus intended to give sickness funds with high proportions of the elderly, resources to provide for their care (Rosen B, Shamai N, "Financing and resource allocation in Israeli health care").

The mechanism was also part of a broader move to change the health sector, which was characterised by adverse and risk selection, into a form of managed competition and bring about quality, efficiency and equality (Shmueli et al, “Risk adjustment and risk sharing: the Israeli experience”).

### 9.3 The Method Currently Used



**Figure 9.0: Flow of funds in Israeli system**

Funds from the government and the income-related premiums are collected in a central pool, called the National Health Fund (Shmueli Amir, 1999 “Inferring capitation rates from aggregate health plans’ costs”). These funds are then prospectively allocated to the sickness funds according to a system of four components:

- the mean premium
- the risk equalisation scale
- a payment for “severe diseases”
- a lump sum subsidy.

The mean premium for a Standard Insured (SI) is intended to cover the average yearly costs for a basic package of benefits. This was originally set to the average cost per insured across all four sickness funds in 1994, and is updated regularly (in 1999 this was 2872 IS). The mean premium is then adjusted using the risk equalisation scale.

The risk equalisation scale is based on one risk factor: age, which is divided into 9 categories. Weightings are then defined as follows:

**Table 9-1: Weightings for risk equalisation scale**

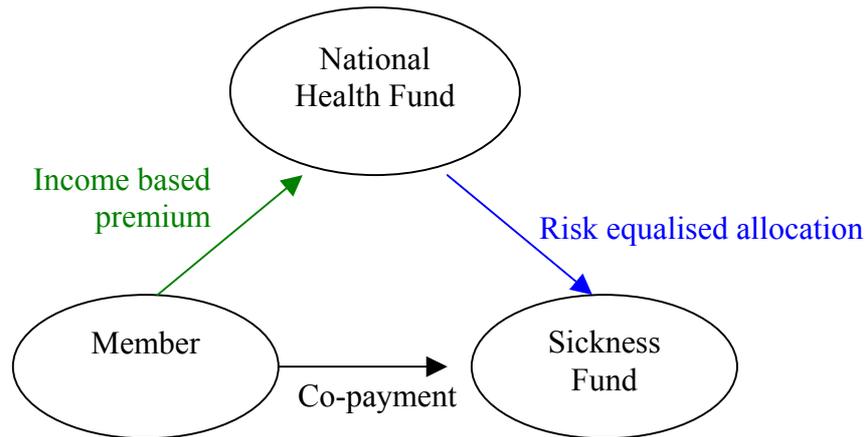
| Age Category | Weighting |
|--------------|-----------|
| 0 – 4        | 1.26      |
| 5 – 14       | 0.48      |
| 15 – 24      | 0.42      |
| 25 – 34      | 0.58      |
| 35 – 44      | 0.74      |
| 45 – 54      | 1.21      |
| 55 – 64      | 1.86      |
| 65 – 74      | 2.90      |
| 75+          | 3.64      |

*Source: Shmueli A et al, “Risk adjustment and risk sharing: the Israeli experience”*

The risk-equalised premiums are determined by multiplying the mean premium by the above scale. Thus, a person between the ages of 65 – 74 will have a weighting of 2.90 when compared to the Standard Insured (whose weighting is assumed to be 1). (Shmueli et al, “Risk adjustment and risk sharing: the Israeli experience”).

The payment for “severe diseases” introduces a form of risk sharing to the Israeli allocation. A sickness fund will receive a fixed payment (based on estimates of annual costs for the disease) for each member who has one of the following five conditions: AIDS, Gauche’s disease, end stage renal failure requiring dialysis, Talasemia, and Hemophilia (See Appendix E) (Rosen and Shamai, “Financing and resource allocation in Israeli health care”).

The lump sum payment paid to sickness funds serves as a “safety net” to prevent insolvencies. A global government subsidy is set for this “safety net” and is allocated to the sickness funds according to the risk equalisation weighting (using the above scale) of their members. Members’ average income is also taken into account, since this affects the level of co-payments levied (Shmueli et al, “Risk adjustment and risk sharing: the Israeli experience”).



**Figure 9.2: Israeli risk equalisation**

## 9.4 Problems with the Current System

The estimation of the mean premium is significantly influenced by the market shares of the health insurers. In Israel, GSF is the largest health insurer and has a 58% market share - thus age-specific costs will be skewed in favour of GSF's own costs.

Further, age alone is an insufficient predictor of medical costs, leaving significant incentives to risk select. (Shmueli, 1999 "Inferring capitation rates from aggregate health plans' costs").

## 9.5 The Evolution of Risk Equalisation

Since its original inception in 1995, the risk equalisation scheme has only been technically changed once (January 1997) with the modification of the weightings given to each age category. The changes are shown in tabular form below.

**Table 9-2: Risk equalisation weight changes**

| Age Category | Weighting   |                  |
|--------------|-------------|------------------|
|              | 1995 & 1996 | Since 1 Jan 1997 |
| 0 – 4        | 1.17        | 1.26             |
| 5 – 14       | 0.45        | 0.48             |
| 15 – 24      | 0.50        | 0.42             |
| 25 – 34      | 0.73        | 0.58             |
| 35 – 44      | 0.81        | 0.74             |
| 45 – 54      | 1.17        | 1.21             |
| 55 – 64      | 1.69        | 1.86             |
| 65 – 74      | 2.78        | 2.90             |
| 75+          | 3.48        | 3.64             |

*Source: Shmueli A et al, “Risk adjustment and risk sharing: the Israeli experience*

## **9.6 Proposed Changes**

While there is no model currently being considered to succeed the current version, the Ministry of Health has identified four main areas which are currently being researched. These are: including a regional risk factor to take into account geographical differences in health costs; the use of health status as a risk factor; alternative risk sharing mechanisms, and the method of determining the mean premium (Shmueli et al, “Risk adjustment and risk sharing: the Israeli experience”).

## 10. Netherlands

### 10.1 Outline of Health System

The Dutch health system is largely financed through compulsory premium payments to the Central Sickness Fund Council (CSFC), while the provision of health care is divided into three categories of services: those under the Exceptional Medical Expenses Act (Algemene Wet Bijzondere Ziektekosten or AWBZ), those under the Health Insurance Act (Ziekenfondswet or ZFW) and private insurance.

The AWBZ provides a basic compulsory insurance for serious illness, mental healthcare, elderly care and long-term disability expenditures for all Dutch residents. It is financed by an income dependent premium (up to a maximum), and expenditure for services provided is retrospectively reimbursed (to the insurers). There is no alternative private insurance for these services.

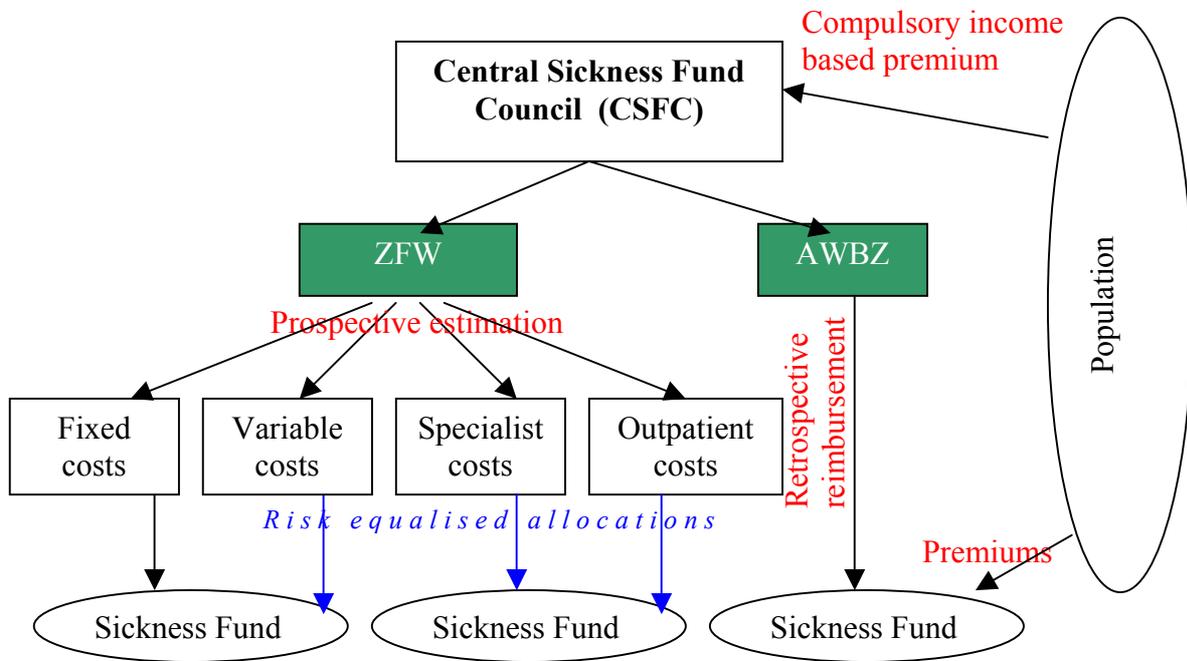
The ZFW covers general practitioners, dental care, and short-term hospital care. Only those under the age of 65 with annual earnings of less than a threshold level (NLG64600 in 2000) are eligible for cover. For residents over the age of 65, annual income of less than a lower threshold level (NLG41100 in 2000) qualifies for coverage. In all, this amounts to about 63% of the population (who thus have compulsory membership with one of the competing Sickness Funds (in 1999 there were 28) or Ziekenfonds), with most of the remaining 37% purchasing private health insurance from a private insurers. Those insured under the ZFW are required to pay a compulsory income dependent premium (which is partly paid by their employer) as well as a nominal premium (which is set by the sickness fund and must be community rated). (Oliver A J, "Risk Adjusting Health Care Resource Allocations").

Sickness funds are able to compete nationally, with members being able to change funds once a year. Open enrolment and community rating is compulsory (for both the ZWF or AWBZ), but there are incentives for subtle risk selection (see Appendix A). (Oliver A J, "Risk Adjusting Health Care Resource Allocations") Further, the benefits provided are determined by the government. Under private health insurance, on the other hand, insurers can offer products that are not as restricted. Private insurers are, however, obliged under the Medical Insurance Access Act (Wet Toegang tot Ziektekostenverzekering, or WTZ) to offer a standard package policy whose premium is set by the government, and must be operated on an open enrolment basis for those who do not have cover under the ZWF. For any non-standard package, members can be charged risk-rated premiums, and even rejected. (O'Connor J et al "Irish Private Health Insurance and International Comparisons")

Following reforms in January 1998, the budgets allocated (prospectively) to sickness funds under the ZFW are divided into four components:

1. Fixed hospital costs
2. Variable hospital costs
3. Specialist health care costs
4. Outpatient care (including GPs, medicine, paramedic services, and dentistry)

*Fixed hospital cost* allocations are based on historical costs (per member for each sickness fund). *Specialist health allocations* are prospectively performed and subject to risk equalisation. The remaining two categories have a mix of risk equalised allocation and historical costs (Ministry of Health, Welfare and Sport, “Health insurance in the Netherlands”).



**Figure 10.0 Flow of Health Funds in Netherlands**

Source: Oliver Adam J. “Risk Adjusting Health Care Resource Allocations”

Since the budget allocations under the ZWF are prospective, it is necessary to perform retrospective adjustments to correct for differences in predicted and actual experience, as well as any costs beyond the insurers’ control.

The first retrospective adjustment is an “excess loss compensation” mechanism. This involves compensating insurers for 90% of all expenditures incurred by members whose *variable hospital costs* or *outpatient costs* exceeded a certain threshold (in 1999 this was NLG10000 per member) level.

Further for each component, if any shortfall is experienced, a certain percentage is reimbursed. They are as follows:

**Table 10-1: Retrospective reimbursement in the Netherlands**

|                         | Percentage of shortfall reimbursed | Other adjustments |
|-------------------------|------------------------------------|-------------------|
| Fixed hospital costs    | 95%                                | -                 |
| Variable hospital costs | 25%                                | Excess Loss       |
| Specialist costs        | 95%                                | -                 |
| Outpatient costs        | 0%                                 | Excess Loss       |

*Source: Ministry of Health, Welfare and Sport, "Health insurance in the Netherlands"*

## 10.2 Objectives of Risk Equalisation

Government policy is to increase competition between sickness funds (with the aim of improving quality and efficiency of care), and with provisions to increase competition come incentives to risk select (WRR, "Report to the Government no.52).

Further, insurers are increasingly responsible for any deficits incurred. The risk equalisation mechanism was introduced to counter any incentives to risk select (that were introduced by such policies) in order to maintain solidarity within the health system.

## 10.3 The Method Currently Used

The prospective budget allocations for variable hospital costs, specialist health costs, and other non-hospital service costs are risk equalised in a similar manner. The risk factors used are:

- Age
- Gender
- Region (or urbanisation)
- Socio-economic status.

However, since sickness fund cannot influence certain factors that affect costs, historical costs are also taken into account when determining allocations for "variable costs" and "other non-hospital costs". Since 2000, 30% of the budget for these groups is based on historical costs, with the remaining 70% based on the risk equalisation formula (Ministry of Health, Welfare and Sport, "Health insurance in the Netherlands").

Note that private insurers are required to contribute to a secondary pool (the MOOZ) to subsidise the sickness funds (offering compulsory insurance) which have a relatively old age profile (Jost, “Private or public approaches to insuring the uninsured”). This is to take into account the fact that there is a disproportionate number of people over the age of 65 in the compulsory scheme, even though members cannot change from private to compulsory over the age of 65.

## **10.4 Problems with the Current System**

According to Douven (“Regulated competition in health insurance markets”), the risk equalisation mechanism only predicts approximately 10% of the variance in health care expenditures. This can be explained by the fact that only demographic risk factors are utilised in the risk equalisation, while health-related factors are ignored. It is currently being debated whether “pharmacy cost groups” could be included (Van Doorslaer and Schut, “Belgium and the Netherlands Revisited”).

## **10.5 The Evolution of Risk Equalisation**

Up to the 1980s, the health care market was highly regulated with no real incentives to risk select. Up to 1991, sickness funds were retrospectively reimbursed for expenditure, thus leading to inefficiency and increasing costs. A response to this was to promote competition in the health system, which resulted in insurers bearing financial risk with the opportunity to freely contract with health care providers. In turn, members were granted the right to choose which insurer to contract with.

In order to ensure equality and solidarity within the health system, community rating, open enrolment and risk equalisation were introduced in 1993 (WRR, “Report to the Government no.52). Originally the risk equalisation formula was based only on age and gender. Between 1995 and 1999, the risk equalised portion of the prospective payment to sickness funds was increased from 2.5% to 35%, with “region” and “disability” status being included in the risk equalisation mechanism in 1995 (see Appendix C). (Van Doorslaer and Schut, “Belgium and the Netherlands Revisited”)

In 1999, the “disability” factor was replaced by an “insurance grounds” factor, which groups people according to the reason for having health insurance. Following this in 2000, budget allocations under the ZFW became a combination of historical costs (30%) and the risk adjustment formula (70%) (Ministry of Health, Welfare and Sport, “Health insurance in the Netherlands”).

|   | 1997   | 1998                            | 1999                                   | 2000  |
|---|--|---------------------------------|--|---|
| <b>Hospital costs: fixed</b>              | Historical   | Historical                      | Historical                             | Historical  |
| <b>Hospital costs: variable</b>           | age, gender, region, disability                    | age, gender, region, disability | age, gender, region, insurance grounds | Historical (30%) & age, gender, region, socio-economic status (70%) |
| <b>Non-hospital costs: Specialist</b>     | <i>(in 1997 this was part of "other services")</i> | age, gender, region, disability | age, gender, region, insurance grounds | age, gender, region, socio-economic status                          |
| <b>Non-hospital costs: Other services</b> | age, gender, region, disability                    | age, gender, region, disability | age, gender, region, insurance grounds | Historical (30%) & age, gender, region, socio-economic status (70%) |

*Source: Ministry of Health, Welfare and Sport, "Health insurance in the Netherlands"*

## 11. New Zealand

New Zealand's health system consists of a mix of private and public funding, the latter being the most significant aspect of the system. Health funds are allocated by the Health Funding Authority to four regions.

The Ministry of Health sets the total health budget (which is independent of the allocation process) and then allocates it according to three Population-Based Funding Formulae (PBFF): Personal Health, Public Health, and Disability Support Services.

Each of these formulae divides the relevant population into categories based on age, gender and ethnic group. Each group is then weighted by the cost of providing the relevant service to that group. A region's total allocation will simply be the total of the cost-weightings (summed over all its risk groups). In addition to this, each formula has some further adjustments which are specific to that area of health.

A unique aspect of the Personal Health formula is that it also adjusts for the "Unmet need for the Maori population". This adjuster is based on Maori Standardised Mortality Ratios (Under 65) to reflect premature mortality differences for the Maori population (Ministry of Health, "PBFF").

## 12. Russian Federation

### 12.1 Outline of Health System

The Russian Federation was established in 1991 with the end of the USSR and the Soviet era. The federation consists of 89 territories: 49 provinces (oblasts), 6 regions (krai), 21 republics, 10 autonomous states (okrugy) and 3 other territories. In turn, each area is divided into districts (rayons). With the political change in 1991, came health reformation in an attempt to reduce costs and foster efficiency through privatisation (WHO, “Highlights on health in the Russian Federation”).

In 1993, a system of compulsory health insurance was established, with supervision by the Federal Mandatory Health Insurance Fund (FMHIF), which is responsible to the Ministry of Health. The FMHIF monitors the functions the Territorial Mandatory Health Insurance Funds (TMHIF) who contract with insurers to purchase health care for the population in the relevant region.

In 1998, 86.7% of the population was covered by the compulsory health insurance, which is characterised by a regionalised system of financing due to the federation’s size and diversity.

The Territorial funds guarantee care to all citizens in their jurisdiction and have to provide for any people who do not organise their own insurance. In some regions there are no insurance companies, and the TMHIFs can establish “branch funds” (BMHIF) which act as insurers (until such stage when an insurer takes over) and contract with providers (WHO, “Highlights on health in the Russian Federation”).

Within regions, insurance funds compete for members under open enrolment, and receive a risk equalised capitation payment for each member from Territorial funds (Berman, “National health insurance in Poland: A coach without horses?”).

The health departments in each oblast, krai and autonomous region govern local health care and are required to finance up to 60% of health costs. Many of these health departments allocate their responsibilities to the Territorial funds.

The Territorial funds are responsible for the collection and allocation of the insurance premiums, of which 0.2% is paid to the Federal fund to allow equalisation across regions. These premiums, which are set by the central government, are income-related (3.6% with no ceiling), and deducted monthly.

Members cannot exit the system, although higher earners can purchase supplementary insurance (in addition to their guaranteed basic package) from private insurers. The local government contributes on behalf of those members who do not have any income (e.g. unemployed, retired, children, disabled etc). In addition to this, certain services carry levies, including those not in the basic package (WHO, “Health Care Systems in Transition: Russian Federation”).

## 12.2 The Method Currently Used

The Territorial Funds allocate funds to insurers on the basis of a risk equalised capitation formula, which takes into account differences in risk structure (Sinuraya T, “Decentralisation of the health care system and territorial medical insurance coverage in Russia”).

However, according to Dimitriev et al (“Economic problems of health services system reform in Russia”): “It is not uncommon that the capitation ratios that (territorial funds) use to transfer the funds to health care medical insurance companies are revised several times a year.” This, along with the language barrier and the sheer number of regions, makes it exceedingly difficult to pinpoint the exact details of the mechanism.

Further, the Russian health system is under severe stress due to the country’s economic problems. Many oblasts have not implemented the reforms, while political friction between the Oblast Health Authorities and the Territorial Funds creates even more instability (Klugman et al "Health Reform in Russia and Central Asia").

## 13. Switzerland

### 13.1 Outline of Health System

Switzerland is divided into 26 provinces or cantons, and it is the authorities at this level that are responsible for much of health policy, giving rise to essentially 26 different health systems. However, most health insurance issues are controlled by federal law, and as such do not differ significantly between cantons (Beck et al, “Risk Adjustment in Switzerland”).

In January 1996, Switzerland’s health system was reformed with the Federal Law on Health Insurance (KVG), which saw the establishment of compulsory health insurance. The benefits offered under this compulsory insurance are subject to community rating (for a given region) and open enrolment. The form of community rating used is regional, with premiums allowed to differ between the 78 defined regions (3 per canton). However, within each region a fund must charge a flat rate premium (which they can set) for all members in that area.

Under the compulsory insurance, a standard package is defined, which must be offered by all sickness funds, and cannot be reduced. This package is comprehensive and covers outpatient and inpatient care, as well as various other therapies (e.g. home nursing care). In addition to this, risk-rated supplementary insurance can also be offered by the sickness funds (approximately 70% of the Swiss population has some form of this insurance).

Members have the freedom to change insurers (open enrolment takes place every half year), and providers of health care are generally paid on a fee-for-service basis (Dixon, “Switzerland: protecting solidarity and containing costs”). In 2000 there were approximately 100 independent sickness funds in Switzerland, with an average of 40 to 60 sickness funds operating in each canton (Beck et al, “Risk Adjustment in Switzerland”).

Copayments (i.e. members are not fully subsidised for all treatment) are an important aspect of funding of health care in Switzerland (14.4% in 1999), with the levels being set by the Ministry of Health. The aim of this is to reduce overall health costs (Belien, “Patient Empowerment in Europe”).

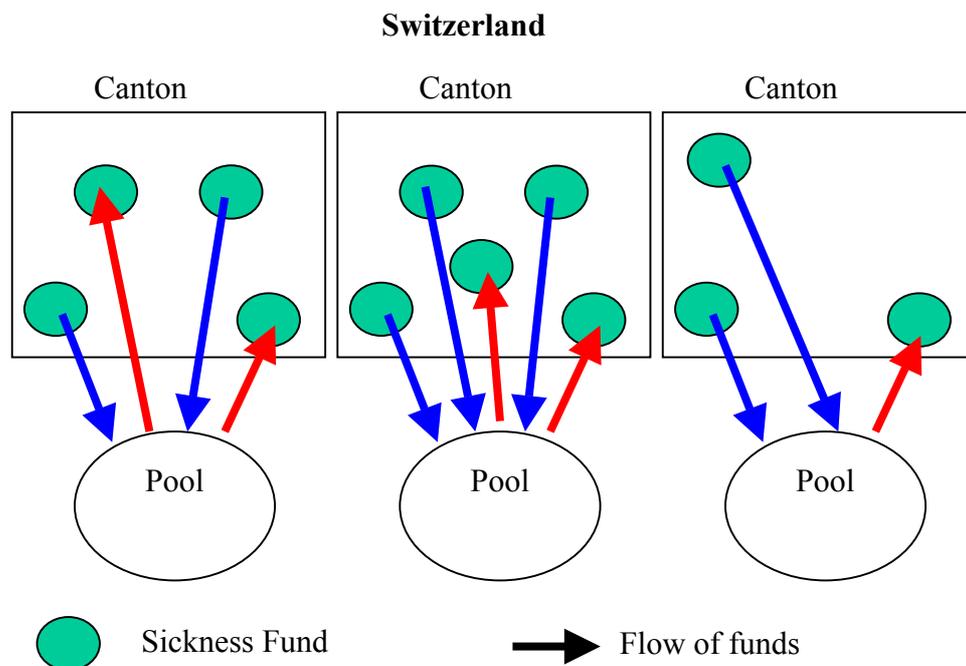
Further, to assist low-income earners in the payment of premiums, the federal and canton governments pay income related subsidies to directly to the members.

### 13.2 Objectives of Risk Equalisation

The previous health system encouraged risk selection, and this led to some funds having young age profiles with low premiums. The remaining funds were left with an increasingly older population, which threatened financial stability.

The risk equalisation mechanism was introduced in 1993 to remove this discrepancy, but retain the decentralisation of health care. (n/e/r/a, “Risk Adjustment and Its Implications for Efficiency and Equity in Health Care Systems”). It was intended that this would ultimately enhance solidarity and improve cost control. (Dixon A, “Switzerland: protecting solidarity and containing costs”).

### 13.3 The Method Currently Used

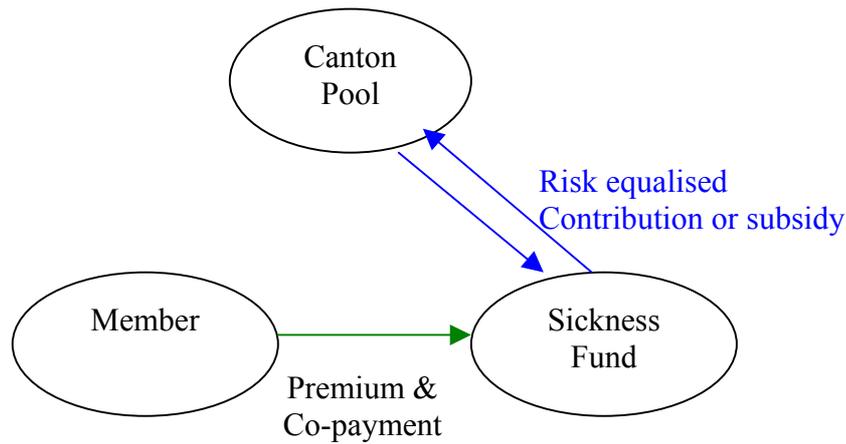


**Figure 13.1: Swiss risk equalisation (26 pools)**

The risk equalisation process is performed retrospectively (i.e. based on actual expenditure) and at the canton level, giving rise to 26 separate calculations. Note that inter-cantonal equalisations are considered to be undesirable, and solidarity is limited to canton borders (n/e/r/a, “Risk Adjustment and Its Implications for Efficiency and Equity in Health Care Systems”).

The formula is based on two risk factors: age and gender (European Observatory on Health Care Systems, “Health Care Systems in Transition: Switzerland 2000”), with children up to 18 being exempt from the procedure. The population is first divided by gender, and then into 15 age groups (19-25, 26-30, 31-35, ... 86-90, 91+), giving a total of 30 risk groups.

The vast differences in risk structure (due to age and gender) of the various sickness funds is reflected in the equalisation payments. In 1998, 62 funds had to pay into the pools, while 56 received subsidies. However, 71% of the total fund was contributed by only five sickness funds, with the equivalent number receiving 83% of the total subsidies (Beck et al, “Risk Adjustment in Switzerland”).



**Figure 13.2: Risk Equalisation in Switzerland**

Note that the risk equalisation process is currently limited to a life of 13 years (1993 – 2005), in the belief that after this period consumer mobility will have increased sufficiently to prevent profitable cream-skimming.

However, according to Beck et al (“Risk Adjustment in Switzerland”), this mobility has remained low, with significant potential for risk selection, and as such it may be necessary to retain the mechanism as a permanent feature of the health system.

## 13.4 The Calculation

While calculations for each canton are performed independently, they are all based on the same formula. Note that all quantities in this calculation are based at the canton level.

The payments (or subsidies from) to the canton pool are calculated in three steps. The first step is to determine the per capita average health care expenditure.

Let:

$B_i(k)$  be the benefits paid by insurer  $i$  for risk group  $k$ .

$B(k)$  be the total benefits paid by all insurers for risk group  $k$

Thus,  $B(k) = \sum_i B_i(k)$

$N_i(k)$  be the number of members covered by insurer  $i$  in risk group  $k$

$N(k)$  be the total number of members across all insurers in risk group  $k$

Thus,  $N(k) = \sum_i N_i(k)$

Then,

$$\bar{E} = \frac{\sum_k B(k)}{\sum_k N(k)} \quad \text{(Average per capita health expenditure)}$$

Where  $\bar{E}$  is the average *per capita* health expenditure for all insurers in the canton.

The second step is to determine the difference between average *per capita* expenditure for risk class  $k$  (over all insurers) and the average *per capita* expenditure over all risk classes ( $\bar{E}$ ). This is denoted by  $R_k$ .

$$R_k = \frac{\sum_i B_i(k)}{\sum_i N_i(k)} - \bar{E} \quad \text{(Per capita difference for risk class k)}$$

On the basis of this, the payment ( $P_i$ ) to insurer  $i$  from the risk equalisation pool is:

$$P_i = \sum_k R_k N_i(k) \quad \text{(Contribution / Subsidy)}$$

Note that  $\sum_i P_i = 0$ , since the sum of deviations from the average is equal to zero.

(Beck K et al, “Risk Adjustment in Switzerland”)

## 13.5 Problems with the Current System

The current risk factors (age and gender) account for only approximately 4% of total variance in health expenditure, thus retaining significant incentives to risk select

Further, the current age-bands, while comprehensive (15 groups), have also presented problems. Groups such as “91+” are often small and the use of statistical techniques to allocate funds on this basis may not be appropriate. An example given by Beck et al (“Risk Adjustment in Switzerland”) is the Appenzell canton, which has 14 males in the 91+ category.

Supplementary insurance can also be used to risk select, since many people simply enrol with the same insurer for both supplementary and compulsory insurance. Other subtle selection forms are also present (see Appendix A) and it has been reported by consumer organisations that inquiries by certain members are often ignored (Beck et al, “Risk Adjustment in Switzerland”).

## 13.6 The Evolution of Risk Equalisation

The risk equalisation mechanism was first introduced in 1993. At this stage, the risk groups in each canton were defined as follows:

**Table 13-1: 1993 risk groups**

|                |                 |                    |
|----------------|-----------------|--------------------|
| Risk Group 1 A | Males           | Aged 16 – 59 years |
| Risk Group 1 B | Females         | Aged 16 – 59 years |
| Risk Group 2   | Males & Females | Aged 60 – 59 years |
| Risk Group 3   | Males & Females | Aged 70 and above  |

This was extended in 1994 to 16 groups. This 1994 grouping was divided into males and females, and again into 4-year age bands for ages between 16 and 45. For ages above 45, males and females were combined with age bands: 45 – 59; 60 – 69; 70 and above. A further group containing both males and females was established for the age band 16 – 45 (n/e/r/a, “Risk Adjustment and Its Implications for Efficiency and Equity in Health Care Systems”).

Apart from the changes to these age bands, no other factors have been introduced.

The system is currently being reviewed (the law only provides for risk equalisation until 2005), with a number of proposals for change. These proposals include dropping the system altogether (as proposed by the “net payers into the fund”) to adding further risk factors such as mortality and health status (prior hospitalisation or a more complex inpatient diagnosis system).

There have also been suggestions to make the system prospective (Beck et al, “Risk Adjustment in Switzerland”).

## 14. United Kingdom

Risk equalisation in the United Kingdom (which comprises of four countries: England, Northern Ireland, Scotland and Wales) is different to that in many other countries due to the structure of the health system - the National Health Service (NHS). In place of private health insurers, there are regionally-defined, non-competing health authorities (boards).

These health authorities are funded through taxation, and each covers the population that falls within their geographical jurisdiction (Oliver Adam J, “Risk Adjusting Health Care Resource Allocations”). A small amount of income is also generated through charges levied on certain services.

The NHS provides for comprehensive health care based, not on ability to pay, but rather need, thus extending the right to health care to all citizens. (NHS Wales, “About the NHS”).

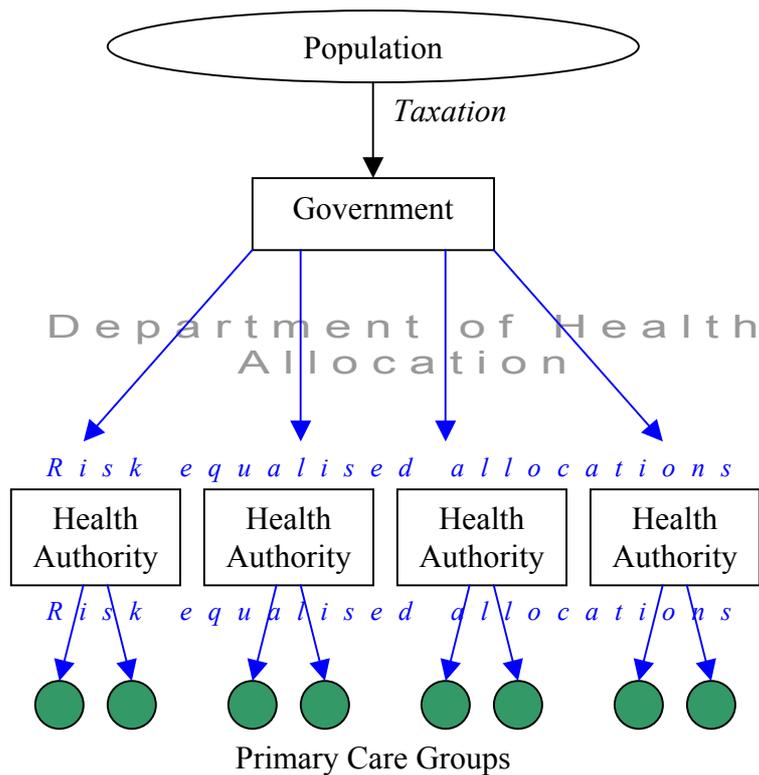
In addition to the NHS, there is a growing market for private health insurance whose premiums are risk rated. The private packages are however, often limited to specific providers and will only pay if an NHS service is not offered within a time period (Koen , “Public expenditure reform: the health care sector in the United Kingdom”).

### 14.1 England

#### 14.1.1 Outline of Health System

In England there are 100 health authorities whose main function is to allocate funds to local health care providers. These funds are allocated to the health authorities by the Department of Health. Local health care providers fall into two main groups: Hospital and Community Health Services (HCHS), which requires the most funding, and Family Health Services (FHS). Family Health Services involves primary health care, including general practitioners and prescription medication.

In April 1999, the National Health Service (NHS) was reorganised, giving rise to Primary Care Groups (PCGs) which each consist of doctors and nurses located in a specific geographical region. These health givers receive a collective budget from the health authorities to provide health care for the population within their region.



Source: Oliver Adam J, "Risk Adjusting Health Care Resource Allocations"

### 14.1.2 Objectives of Risk Equalisation

The objective of Risk Equalisation in England is to promote geographical equity in the access to health care or "equal access for equal need". Thus risk equalisation has the objective of promoting equity rather than removing incentives to risk select (as with many other countries).

It should be noted that, in England, the risk equalisation mechanism is often referred to as "weighted capitation". (Oliver Adam J, "Risk Adjusting Health Care Resource Allocations")

### 14.1.3 The Method Currently Used

There are two stages at which allocated funds are equalised: the allocation from the Department of Health to the health authorities; and secondly, the allocation from the health authorities to the Primary Care Groups (PCGs).

The funds allocated to the health authorities are based upon the size of the population covered by that health authority, and adjusted for the local age structure, the local input costs of delivering health services, and local health care "needs" as measured by the needs index (relative to the national average). The current formula was introduced in 1996.

The allocation of resources by health authorities to primary care are generally equalised on the basis of age, gender and healthcare-related price differentials. However, the risk equalisation at this level is not compulsory, and there is no mandatory system currently in place. Such a system is being researched, but may not be implemented since a more extensive set of risk equalising factors may be statistically invalid (due to the small populations to which it is being applied). (Oliver Adam J, “Risk Adjusting Health Care Resource Allocations”)

The Advisory Committee on Resource Allocation (ACRA) is responsible for reviewing the formula.

#### **14.1.4 The Calculation**

The risk equalisation of funds allocated to each authority is derived from the following formula (called the York Formula):

$$W_i = P_i(1 + a_i)(1 + c_i)(1 + n_i)$$

Where:

- $W_i$  is the weighted population covered by health authority  $i$
- $P_i$  is the population size covered by health authority  $i$
- $a_i$  is an age-adjustment relevant to the population covered by health authority  $i$
- $c_i$  reflects the local costs of delivering health for health authority  $i$
- $n_i$  is a needs-adjustment (over and above age needs) for the population covered by health authority  $i$

The budget allocated to health authority  $i$  is then determined by multiplying  $W_i$  by the national average per capita expenditure  $K$  (Peacock et al, “Predicting the expected costs of health care”).

$$\text{Budget}(i) = KW_i$$

The needs-adjustment factor ( $n_i$ ) is based on a needs index (See Appendix F). The coefficients in this needs index indicate the relative weight attached to each variable. Thus, to calculate the needs index within each sector, each needs-variable in that sector is raised to the power of its coefficient, and the product of the variables evaluated.

For example, the *acute needs index* is given by:

$$(\text{SMR})^{0.1619} \times (\text{Proportion of pensionable age living alone})^{0.0765} \times \dots \times (\text{Under 75 standardised limiting long-standing illness ratio})^{0.2528}$$

The needs factors are applied (approximately) by the Department of Health to the total Hospital and Community Health Services (HCHS) budget as follows:

|  |     |
|--|-----|
| Acute needs factors                    | 64% |
| Psychiatric needs factors              | 10% |
| Community mental illness needs factors | 1%  |
| Non-psychiatric needs factors          | 11% |
| Unadjusted for need                    | 14% |

The national averages of  $a$ ,  $c$  and  $n$  are set at zero. Thus, if health authority  $i$  covers a population that is 7% older than the national average, with health delivery costs that are 3% below national average, and with needs that are 5% above the national average, then:  $a_i = 0.07$ ,  $c_i = 0.97$ , and  $n_i = 0.05$ .

(Oliver Adam J, “Risk Adjusting Health Care Resource Allocations”)

#### **14.1.5 Problems with the Current System**

The most controversial factor in the English risk equalisation system is the “health care needs” factor.

The needs-coefficients were estimated from hospital inpatient utilisation data. The extent to which this sufficiently reflects health care need is important in determining its relevance. Relative utilisation may not be a good indicator of relative need, since certain sectors in society may have different thresholds at which they seek health care.

Further, utilisation may be negatively correlated with the opportunity cost of seeking this healthcare (e.g. employed people have to take time off work). The use of the Standardised Mortality Rate (SMR) for those under 75 years of age assumes that mortality is a good proxy for need.

In the English system, there is no consideration for proximity to health care services. Thus it does not take into account the fact that it may be more costly for people who live in rural areas to get to health care facilities. While this factor was included in the Welsh and Scottish systems, the English system did not find it to be significant in predicting hospital utilisation.

In considering the allocation of funds to Primary Care Groups (PCGs), it should be noted that since the doctors are jointly responsible for a budget within a PCG, they bear financial risk. Thus, there exists some motivation for risk selection, something that is compounded by the fact that doctors can remove patients from their lists without explanation. However, no evidence has been found that such risk selection takes place in practice. (Oliver Adam J, “Risk Adjusting Health Care Resource Allocations”)

As with any such system there exist problems, however as Oliver (Oliver A, “Risk Adjusting Health Care Resource Allocations”) states, the risk equalisation mechanism in England ensures a greater level of equality than the level that would exist in its absence.

Note that this formula has been frozen until 2002, pending the outcome of a review to update and overhaul the system in 2003.

### **14.1.6 The Evolution of Risk Equalisation**

The funds allocated by the Department of Health to each health authority have been risk equalised since 1976, originally under the guidance of the Resource Allocation Working Party (RAWP).

Prior to 1995 the “health care needs” risk equaliser was merely the square root of the Standardised Mortality Ratio (SMR) for those under 75 years of age. This method, however, did not necessarily promote equity, since it inherently assumes that mortality rates are the only factor when considering health needs, leading to discrimination against those populations with relatively high levels of non-fatal disease.

In 1996, a new “needs health index” (also called the York index) was introduced, consisting of two sets of variables: “acute sector services” and “psychiatric services”. This was duly extended to the more comprehensive index currently in use (as described above). (Oliver Adam J, “Risk Adjusting Health Care Resource Allocations”)

## **14.2 Northern Ireland**

### **14.2.1 Outline of Health System**

NHS in Northern Ireland is administered by Department of Health and Social Services. There are four Health and Social Services Boards (HSS), which differ from the health authorities of England, in that they are responsible for both health and social services (European Observatory on Health Care Systems, “Health Care Systems in Transition: United Kingdom 1999”).

### **14.2.2 Objectives of Risk Equalisation**

The Risk Equalisation mechanism in Northern Ireland aims to ensure a fair distribution of resources to each of the HSS Boards (CFRG, “Allocating resources to health and social services boards”).

### **14.2.3 The Method Currently Used**

The formula used in Northern Ireland has just undergone a major revision and is currently (2001/2002) being introduced. The previous formula was largely based on English data and formula, while the new formula uses Northern Ireland's data. Under this system, nine explicit groups (called "Programmes of Care" or POCs) are targeted by a specific formula for that group. The POCs are:

**Table 14-1: POC definitions & allocation proportions**

| <b>POC</b> | <b>Description</b>                      | <b>% Allocated</b> |
|------------|---|--------------------|
| 1          | Acute Services                          | 40.23 %            |
| 2          | Maternity and Child Health              | 5.3 %              |
| 3          | Family and Child Care                   | 6.2 %              |
| 4          | Elderly Care                            | 24.54 %            |
| 5          | Mental Health                           | 8.45 %             |
| 6          | Learning Disability                     | 7.1 %              |
| 7          | Physical and Sensory Disability         | 3.12 %             |
| 8          | Health Promotion and Disease Prevention | 2.08 %             |
| 9          | Primary Health and Adult Community      | 2.97 %             |

In general, the formula for each POC consists of an age/gender weighting and an additional needs weighting, which are applied to the relevant population in the POC. These needs indices are calculated (as with those in the English system) by taking the product of the variables, with each variable raised to its coefficient (See Appendix G).

Each POC calculation is then weighted according to an allocation percentage (see above table). These values (as well as the weights themselves) will be updated on a regular basis to ensure that they remain relevant in a dynamic environment (CFRG, "Allocating resources to health and social services boards").

In addition to the POC adjustments, a "rurality" adjustment is performed by making an addition (or subtraction) to the POC allocation to each HSS board.

### **14.2.4 Problems with the Current System**

Some of the weightings were not completely based on Northern Ireland's data, and retained some of the English data. This is due to the fact that some of the necessary data is not yet available, and as such more research into these areas (e.g. Learning Disability) is required.

## 14.3 Scotland

### 14.3.1 Outline of Health System

The NHS in Scotland is administered by the Department of Health in the Scottish Office, which is responsible for health policy in the country (European Observatory on Health Care Systems, “Health Care Systems in Transition: United Kingdom 1999”).

Funding for the NHS in Scotland comes from the UK government, most of which is allocated to the 15 health boards, which are the Scottish equivalents of the English health authorities. These health boards are responsible for providing health care to the population within their jurisdiction and have the freedom to determine the policies of delivery (Scottish Executive Health Department, “Fair shares for all”).

### 14.3.2 Objectives of Risk Equalisation

Risk equalisation forms part of the broader health objective of health equality in Scotland, and the improvement of services in poor and deprived communities. It is thus intended that risk equalisation will reallocate resources where need is greatest.

### 14.3.3 The Method Currently Used

The Arbutnott Formula for the allocation of funds in Scotland was introduced in 2000 (replacing the 20 year old “SHARE” formula) and will be phased in over a period of 5 to 6 years to ensure that the health boards have sufficient time to adapt.

The formula is based on an estimate of the population covered by a health board, which is then adjusted for certain factors. This includes an adjustment for the age/ sex profile of the health board; a needs factor based on the morbidity and life circumstances (MLC) of the population; and a regional factor (urban versus rural).

$$W_i = P_i \times (A_i \times B_i \times C_i)$$

Where:

$W_i$  is the weighted population for health board  $i$

$P_i$  is the population for health board  $i$

$A_i$  is an age/sex adjustment for health board  $i$

$B_i$  is a needs factor based on the morbidity and life circumstances (MLC) for health board  $i$

$C_i$  is a regional factor for health board  $i$

For the age/sex adjustment, the population is broken down into age bands per gender for various categories of health care services. For each group, the weighting used is simply the average cost per person in this group, based on actual data.

This weighting is then multiplied by the population in the relevant group for each health board to give their expected costs for that group. An index is then derived for the health boards by summing across all age/gender groups and dividing by the total population. (See Appendix H for the actual age/sex weights for all health service categories).

(Scottish Executive Health Department, “Fair shares for all technical report”)

## **14.4 Wales**

### **14.4.1 Outline of Health System**

The National Assembly for Wales is responsible for the allocation of funds to the five regional health authorities in Wales. In turn, these health authorities purchase health care from providers on behalf of the population in their region.

(NHS Wales, “About the NHS”)

### **14.4.2 Objectives of Risk Equalisation**

The Welsh mechanism attempts to equalise differing geographical needs for Hospital and Community Health Services (HCHS).

### **14.4.3 The Method Currently Used**

Different service blocks are subject to different risk factors: age, gender, the under-75 Standardised Mortality Ratio (SMR), and a sparsity weight.

The sparsity weight is either determined from a survey on travelling distances for people working in the Community Health Services, or from road length per head of population for the ambulance service block. The sparsity weight is an attempt to include the greater costs of providing health care services to dispersed populations.

**Table 14-2: Risk factors in the Welsh risk equalisation mechanism**

| <b>Expenditure Block</b>           | <b>% HCHS Expenditure</b> | <b>Risk Factors</b>                        |
|------------------------------------|---------------------------|--|
| Non-psychiatric inpatient services | 62.0 %                    | Age, gender, under-75 SMR                  |
| Psychiatric inpatient services     | 7.0 %                     | Age, gender                                |
| Outpatient services                | 12.5 %                    | Age, gender, under-75 SMR                  |
| Community health services (CHS)    | 15.0 %                    | Age, gender, under-75 SMR, sparsity weight |
| Ambulance services                 | 3.5 %                     | Age, gender, sparsity weight               |

*Source: Oliver Adam J, "Risk Adjusting Health Care Resource Allocations"*

#### **14.4.4 Problems with the Current System**

The Welsh system does not consider socio-economic factors, and compounding this is the fact that the data used in the model is becoming out-of-date (The current system was introduced in 1991). The model is under review.

## 15. United States of America

### 15.1 Outline of Health System

The regulation of health insurance in the USA has typically been the responsibility of the states (Jost, “Private or public approaches to insuring the uninsured”) and based on the principle of free, private markets. The government does, however, play a major role in funding health care for the elderly and poor, but does not provide universal public coverage.

The USA’s health insurance system can be divided into the following components:

- Employers who provide private health insurance (which covers the employee and their dependents). Regulations regarding this component differ, depending on the number of employees in the group.
- Individuals who purchase private health insurance
- Medicare, which is publicly funded and covers retired people over the age of 65
- Medicaid, which is also publicly funded and covers low-income people
- The uninsured, which forms a significant proportion of the population.

Each state has large degree of autonomy in setting health insurance regulations, and as such, the insurance environment varies markedly between states (O’Connor et al “Irish Private Health Insurance and International Comparisons”).

### 15.2 Medicare

Medicare is a health programme to provide health care for those retirees 65 years or older, as well as some disabled people. The programme is financed mainly through the Federal government with a combination of general taxation and specific income taxes. Further, members must also pay a community rated (nationally) premium for non-inpatient hospital costs.

Medicare does not fully cover all medical costs, and private supplementary insurance is available (MediGap), and is regulated by the Federal and State governments. This regulation includes the setting of premiums, which in some states insurers can risk rate according to age and gender. In other states, this premium must be community rated. Further, insurers can only offer ten different benefit packages for MediGap.

People are not obliged to take up cover with Medicare. Instead they can join a private Health Maintenance Organisation (HMO). The advantage of such a move is that the HMO can offer a wider range of benefit structures (subject to a minimum level). For each Medicare member that an HMO covers, the government will pay a prospective risk-equalised subsidy

The Medicare method of risk equalisation, which was implemented in 1985, is currently changing. Prior to 1999, the mechanism used the following demographic risk factors:

- Age
- Gender
- Region (county)
- Welfare status
- Institutional status (i.e. whether the member lived in a nursing home etc).

Such demographic factors are limited in their explanation of health costs and as result, in January 2000, a new procedure was introduced, with the old one being phased out over a period of 5 years.

Initially, the weighting will be as follows:

| <b>Year</b> | <b>% New</b> | <b>% Old</b> |
|-------------|--------------|--------------|
| 2001        | 10%          | 90%          |
| 2002        | 80%          | 20%          |

The new procedure takes into account health status risk factors, and is based on 15 Diagnostic Cost Groups (referred to as Principle Inpatient Diagnostic Cost Groups or PIP-DCGs since they only consider inpatient diagnoses), as well as age (which is divided into 12 groups), gender, region, and welfare status. (Welch WP, “Does risk adjustment for Medicare patients reward caring for sick patients or liberal admission practices?”).

The PIP-DCG categories represent increasing severity of disability. In 2004, once the current system has been fully implemented, it is envisaged that outpatient diagnoses will also be included.

If the subsidy is insufficient and the Medicare member has to pay a premium to the HMO, then it must be community rated (depending only on the benefit structure). (O’Connor J et al “Irish Private Health Insurance and International Comparisons”).

## **15.3 Medicaid**

Medicaid aims to cover health care for the poor, and is financed by the Federal and State governments. In a similar manner to Medicare, people can take up private insurance with HMOs, who are then paid a subsidy based on a risk equalisation formula. This formula typically uses age and gender as risk factors, but can vary from state to state (O’Connor J et al “Irish Private Health Insurance and International Comparisons”).

Some examples of different methodologies are given below.

### **15.3.1 California's PacAdvantage**

Originally known as the Health Insurance Plan of California (HIPC), this programme was created in 1992, mainly to cater for small-businesses. The risk equalisation formula is based on age, gender, number of children and 120 diagnoses, with the intention of introducing a full DCGs model.

### **15.3.2 New York State**

Since 1993, health insurance for individuals and groups of less than 50 employees has been subject to pure community rating and open enrolment. Until recently risk equalisation was based on age, gender and region, but this has been subsequently revoked.

### **15.3.3 Minnesota**

The 1995 Minnesota Care Law led to the development of a risk equalisation system for public health care programmes from 1998 (Minnesota Department of Health, "Risk adjustment"). The system is based on age, gender and Ambulatory Care Groups (ACGs) as risk adjusters.

### **15.3.4 Washington State Health Care Authority**

This authority purchases health care for state employees, retirees and those who use community clinics. This health care programme is known as the Public Employees Benefits Board Program (PEBB) and the risk equalisation is based on age, gender and Diagnostic Cost Groups (of which there are 13).

(Van de Ven WWP, Ellis RP, "Risk adjustment in competitive health care markets")

## **15.4 Restriction of Research**

There are many examples of risk equalisation methodologies in the public and private sectors in the USA. In the public sector, the trend is strongly towards the use of diagnosis-related groups for risk adjustment. The lack of coding information on diagnosis in South Africa means that these approaches could not be considered feasible.

There is extensive use of risk equalisation by managed care organisations in order to restrict the risk of the providers with whom they contract. The techniques for dealing with provider risk are of great interest, but would lead this current research project too far away from risk equalisation between funds.

Accordingly the use of the USA as a model was deliberately restricted to the brief overview given above. The literature cited is thus a very small fraction of that available on the USA market.

## 16. Other countries

There are a number of other countries, not described above, that are using a form of risk equalisation. This is especially true with respect to publicly funded schemes, which seek to equalise capitated payments both to regional departments and to service providers. This includes countries such as :

- Canada
- Finland
- Norway
- Sweden (Stockholm County hospital resource allocation formula)

(Peacock S et al, “Predicting the expected costs of health care”).

In line with this international trend toward solidarity and the use of risk equalisation, several countries are considering the introduction of such mechanisms. An example is Chile.

### 16.1 Association Internationale de la Mutualité

The Association Internationale de la Mutualité (AIM) is a grouping of autonomous health insurance and social protection bodies operating according to the principles of solidarity and non-profit-making orientation. The organisation has its headquarters in Belgium.

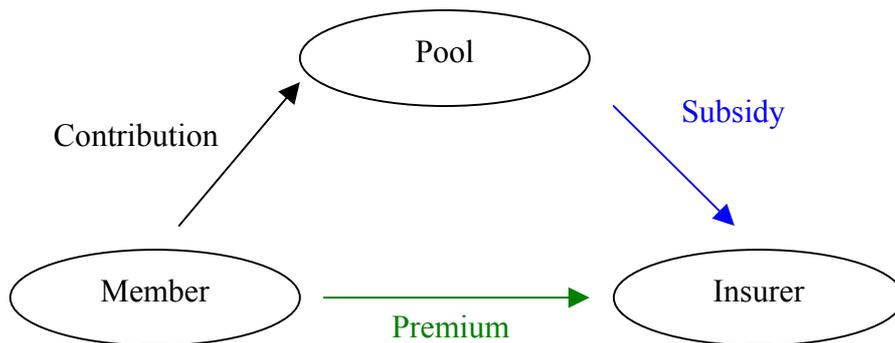
Current membership of AIM includes organisations from the countries listed below. It has not yet been possible to ascertain the presence of risk equalisation systems in all these countries. However, given the common belief in principles of social solidarity, the list provides a useful starting point for further research.

|               |   |                      |  |
|---------------|---|----------------------|--|
| <b>Europe</b> | Belgium<br>Czech Republic<br>Denmark<br>France<br>Germany<br>Greece<br>Hungary<br>Ireland<br>Luxembourg<br>Netherlands<br>Portugal<br>Slovak Republic<br>Slovenia<br>Spain<br>United Kingdom<br>Switzerland | <b>Africa</b>        | Algeria<br>Botswana<br>Burundi<br>Ivory Coast<br>Mali<br>Morocco<br>Namibia<br>South Africa<br>Tunisia<br>Zimbabwe |
|               |   | <b>South America</b> | Argentina<br>Colombia<br>Uruguay   |
|               |   | <b>Middle East</b>   | Israel<br>Lebanon  |

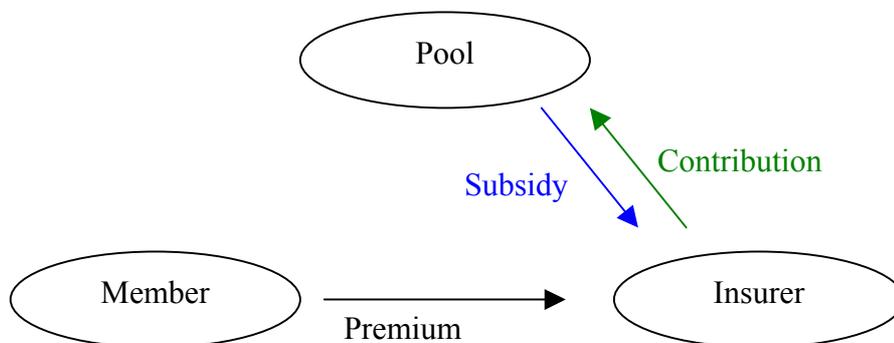
## 17. Comparison of Models

The table overleaf compares the key features of ten examples of risk equalisation described in this monograph.

Two distinct types of systems are identified, based on the flow of contributions and the flow of risk equalisation amounts. These are illustrated below.



**Figure 16.1: System Type A**



**Figure 17.2: System Type B**

|                                       | Australia                 | Belgium                   | Colombia                  | Czech Republic   | Germany                            | Ireland                   | Israel                    | Netherlands           | Switzerland                   | United Kingdom                     |
|---------------------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------------------------|---------------------------|---------------------------|-----------------------|-------------------------------|------------------------------------|
| <b>Risk Adjusters :</b>               |                           |                           |                           |                  |                                    |                           |                           |                       |                               |                                    |
| Age                                   | Age                       | Age                       | Age                       | Age              | Age                                | Age                       | Age                       | Age                   | Age                           | Age                                |
| Gender                                |                           | Gender                    | Gender                    |                  | Gender                             | Gender                    |                           | Gender                | Gender                        | Gender                             |
| Disability                            |                           | Disability                |                           |                  | Disability                         |                           |                           |                       |                               |                                    |
| Region                                |                           | Region                    | Region                    |                  |                                    |                           |                           | Region                | (Region)                      |                                    |
| Other                                 | Hospitalisation           | Mortality<br>Unemployment |                           |                  | (Income)<br>(Number of Dependents) | Hospitalisation           |                           | Socio-economic status |                               | Prior Utilisation<br>Local Factors |
| <b>Timing :</b>                       |                           |                           |                           |                  |                                    |                           |                           |                       |                               |                                    |
| Prospective                           |                           | Prosp.                    |                           |                  |                                    |                           | Prosp                     | Prosp                 |                               | Prosp                              |
| Retrospective                         | Retro                     | Retro                     |                           |                  | Retro                              | Retro                     |                           |                       | Retro                         |                                    |
| <b>Frequency of calculation</b>       | Quarterly                 | Annually                  | Annually                  | Monthly          | Annually                           | Quarterly                 | Annually                  |                       | Annually                      | Annually                           |
| <b>Premium Restrictions</b>           | Lifetime Community Rating | Community Rating          | Zero Premium Contribution | Community Rating | Community Rating                   | Lifetime Community Rating | Zero Premium Contribution | Community Rating      | Community Rating (per region) | Zero Premium Contribution          |
| <b>System Type</b>                    | <b>B</b>                  | <b>A</b>                  | <b>B</b>                  | <b>B</b>         | <b>B</b>                           | <b>B</b>                  | <b>A</b>                  | <b>A</b>              | <b>B</b>                      | <b>A</b>                           |
| <b>Open Entry to New Health Plans</b> | yes                       | no                        | yes                       | yes              | yes                                | yes                       | yes                       | yes                   | yes                           | yes                                |
| <b>Year of implementation</b>         | 1976                      | 1995                      | 1994                      | 1989             | 1994                               | 1996                      | 1995                      | 1991                  | 1993                          | 1991                               |
| <b>Open Enrolment</b>                 | Any time                  | Every quarter             | Annually                  | Annually         | Annually                           | Any time                  | Half Yearly               | Annually              | Half Yearly                   | n/a                                |
| <b>Membership</b>                     | Voluntary                 | Compulsory                | Voluntary                 | Compulsory       | Compulsory                         | Voluntary                 | Compulsory                | Compulsory            | Compulsory                    | Voluntary                          |

Sources: van de Ven W, Ellis R, *Handbook of Health Economics*, Chapter 17, 31 March 1999; The Health Care Working Party of the Society of Actuaries in Ireland, *Private Health Insurance in Ireland: Challenging Times*, 7 June 1995

## 18. Brief Lessons from the Research

The 1990s were a period of rapid development in risk equalisation methodologies. The decade saw the introduction of risk equalisation in many healthcare systems.

The factors used in these models to predict health expenditure vary from demographic (such as age, gender or region) to more complex systems involving health status. All the systems studied used age as a factor.

Many of the models that were initially implemented were crude predictors of health costs, and provided limited success. However, as data systems improved and research into this field has grown, the models have become increasingly complex. The systems of risk-adjustment that have developed in the United States are particularly complex and require extensive data.

The methodology chosen for a particular country must be developed from the economic relationships and systemic problems that are particular to that country. As with managed care, the importation of approaches that were successful elsewhere is likely to prove disastrous.

Risk equalisation is not only necessary between funders, but has relevance wherever risk is passed to subsequent layers of providers.

While the concept of risk equalisation is simple, readers may be somewhat overwhelmed by the technical detail of some of the systems described.

A key lesson from the evolution of risk equalisation methodologies is that the implementation of such a measure need not aim to be perfect. Instead, it is an on-going process which needs to be updated and revised regularly in order to remain relevant and effective.

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## APPENDIX A – Subtle Risk Selection

While community rating and open enrolment ensures that insurers cannot explicitly refuse people cover (either through simply refusing the application or setting premiums prohibitively high), without some form of risk equalisation (or other mechanism), there still exist incentives for insurers to practise “subtle risk selection”.

This can take place when people apply to join a medical scheme, or when insurers encourage people to leave a scheme.

Examples of risk selection at enrolment are:

1. Contracting with health care providers that are not able or suitable for high-risk individuals.
2. Swiss cheese policies – where health coverage is geared toward a specific group of people (e.g. by excluding coverage of certain conditions), or by combining health coverage with other insurance packages (e.g. skiing insurance, which would be targeting the healthy and affluent). This includes supplementary insurance which can be used to target certain individuals, even if a basic package of health coverage is mandatory.
3. Advising those of high risk to seek insurance from other insurers who have more “appropriate coverage”.
4. Marketing strategies which selectively target low risk individuals (such as selective advertising).

An example of insurers risk selecting through “disenrolment” is by deliberately providing poor service to those who are perceived as being high-risk.

(Oliver Adam J, “Risk Adjusting Health Care Resource Allocations”; Shmueli A et al, “Risk adjustment and risk sharing: the Israeli experience”.)

## APPENDIX B – Belgium : Law Leburton

This approach was suggested, but not implemented.

For each sickness fund i:

$$L_i = \frac{(I_i + P_i + W_i + U_i)(1.5I_i + P_i + W_i + 0.8U_i)}{A_i}$$

Where:

$L_i$  is the number of invalids (disabled) in fund i.

$P_i$  is the number of pensioners in fund i.

$W_i$  is the number of widows and widowers in fund i.

$U_i$  is the number of unemployed members in fund i.

$A_i$  is the number of employees in fund i.

The share of government subsidy allocated to insurer i was then:  $\frac{L_i}{\sum L_k}$

This was not based on scientific research, and is thus very limited in application. In the extreme case, when a fund (say k) has no employees in its membership ( $A_k = 0$ ), then  $L_k$  would tend to infinity, and the allocation to insurer k would tend to 1 (i.e. insurer k would get the entire subsidy).

(Schokkaert Erik, Van de Voorde Carine, “Risk adjustment and the fear of markets: the case of Belgium”)

## APPENDIX C – Netherlands : Before 1999

Prior to 1999, the budget allocation to insurers for services provided under the ZFW were performed prospectively, with the estimation for hospital and non-hospital expenditures calculated on different bases. Non-hospital allocations were subject to risk equalisation (as discussed below), while hospital allocations were divided into fixed and variable costs. The variable costs were then also subject to risk equalisation. The fixed costs, on the other hand, were determined by estimating total expected hospital costs, and then subtracting the variable costs.

### The Method

The allocations of funds under the ZFW for Non-hospital care, and the variable costs for hospital care were subject to similar risk equalisation.

#### ***Non-hospital health care allocations***

Each insurer was required to submit information to the CSFC on their previous experience of expenditure on non-hospital health care. The CSFC then estimated the average per capita non-hospital health care expenditures for each age/gender risk group. These averages were then normalised in line with the Ministry of Health's forecast for total non-hospital care costs. In turn, the prospective allocations for non-hospital services were adjusted according to the age/gender mix of each insurer's actual membership.

These adjusted allocations were then multiplied by “disability” and “regional uplift” factors.

The “regional uplift” factor was attempt to take into account the area of residence, and had five levels of urbanisation. Thus, those who are in rural areas (i.e. low urbanisation) would get lower per-capita resource allocation than those who live in urban areas. This factor then adjusts each insurer's allocation according to the degree to which its members are urbanised. This aimed to equalise the differing costs experienced in the different areas, with urban areas generally having higher health costs.

The disability factor involves multiplying the percentage that the disabled members (who must be officially registered as such) form of an insurer's total membership by a certain factor (approximately 2), reducing any incentive to risk select against these people.

Once the allocations had been appropriately equalised for these two factors, the CSFC reduced each insurer's allocation by approximately 10%. This shortfall was covered through a premium levied directly from the insurer's members (which was community rated and thus uniform for all members for a particular insurer, but could vary between insurers) (Oliver Adam J, “Risk Adjusting Health Care Resource Allocations”).

#### ***Variable Hospital Care Allocations***

The risk equalisation of the variable hospital care allocation was similar to that applied to non-hospital allocations. However, with variable hospital costs the budget was based on an average per capita cost function, rather than a direct measurement of average per

capita costs. The cost function was dependent on the number of hospital days, hospitalisations, outpatient visits and day cases for each age/gender risk group. (Oliver Adam J, “Risk Adjusting Health Care Resource Allocations”)

## The Calculation

### *Non-hospital health care allocations*

$$B_i^{nh} = R_i H_i \left( \sum_{k=1}^{38} n_i(k) C(k) \right) - p A_i$$

Where:

$B_i^{nh}$  is the non-hospital health care budget for insurer i

$R_i$  is the “regional uplift” factor for insurer i

$H_i$  is the “disability uplift” factor for insurer i

$n_i(k)$  is the number of insurer i’s members in risk group k

$C(k)$  is the normalised non-hospital average per-capita cost in risk group k

$p$  is the average premium charged by each insurer as estimated by the Ministry of Health (and applied to all insurers)

$A_i$  is the number of people who are liable to pay a premium to insurer i

Each gender is divided up into 5-year age bands. Thus for both male and female, groups are defined for ages 0-4, 5-9, ... , 85-90, and above 90 years. This gives rise to 38 age/gender risk groups in the summation.

The “regional uplift” factor ( $R_i$ ) consists of 5 levels or groups of urbanisation, with group 1 being the most urbanised areas. Each group is assigned an index as follows:

**Table C1: Regional Uplift Factor**

|                           |      |
|---------------------------|------|
| Group 1 (most urbanised)  | 1.16 |
| Group 2                   | 1.04 |
| Group 3                   | 1.02 |
| Group 4                   | 0.91 |
| Group 5 (least urbanised) | 0.87 |

The regional uplift factor for insurer i ( $R_i$ ) is determined by multiplying each group index by the percentage of its members that fall in that group. Thus if an insurer has 40%, 30%, 13%, 13%, and 4% of its members in Group 1 to 5 respectively, then:

$$R_i = 1.16(0.4) + 1.04(0.3) + 1.02(0.13) + 0.91(0.13) + 0.87(0.04) = 1.0617$$

The disability uplift factor ( $H_i$ ) is simply divided into two groups:

|              |       |
|--------------|-------|
| Disabled     | 2.025 |
| Non-disabled | 0.933 |

Thus, if 8% of insurer i's membership is disabled, the factor is determined as follows:  
 $H_i = 2.025(0.08) + 0.933(0.92) = 1.02036$   
(Oliver Adam J, "Risk Adjusting Health Care Resource Allocations")

### ***Variable Hospital Care Allocations***

$$B_i^{\text{var}} = R_i H_i \left( \sum_{k=1}^{38} n_i(k) D(k) \right) - p A_i$$

$B_i^{\text{var}}$  is the variable hospital health care budget for insurer I

$D(k)$  is the average per capita cost function (dependent on the number of hospital days, hospitalisations, outpatient visits, and day cases) for risk group k

Apart from  $D(k)$ , all other variables are the same as in non-hospital allocations above.

(Oliver Adam J, "Risk Adjusting Health Care Resource Allocations")

## **APPENDIX D – Israel : Basic Basket**

- Medical diagnosis and treatment both at clinics and at the home of the patient.
- Preventive medicine and health education (i.e. early diagnosis of embryo abnormalities, vaccinations, counselling for pregnant women, mothers and the elderly).
- Hospitalisation (general, maternity, psychiatric and chronic).
- Surgery and transplant. If medical treatment is not available in Israel, treatment abroad will be covered.
- Preventive dental care for children.
- First Aid and transportation to a clinic or hospital.
- Medical services at the workplace.
- Medical treatment for drug abuse and alcoholism.
- Medical equipment and appliances.
- Obstetrics and fertility treatment.
- Treatment of injuries caused by violence.
- Medication, in accordance with a list issued by the Ministry of Health.
- Treatment of chronic diseases.
- Paramedical services (i.e. physiotherapy, occupational therapy, etc.).

Source: Ministry of Foreign Affairs (MFA - Israel), “National Health Insurance”

## APPENDIX E – Israel : Risk Sharing Payments

| Condition  | Payment (July 1999) |
|------------|---------------------|
| AIDS       | 54 000IS            |
| Dialysis   | 209 000IS           |
| Gauche     | 240 000IS           |
| Hemophilia | 100 000IS           |
| Talasemia  | 48 000IS            |

*Source: Shmueli A et al, "Risk adjustment and risk sharing: the Israeli experience"*

## APPENDIX F – England : Need Index

Variables in the needs index and their respective coefficients are given below:

| <b>Acute needs variables</b>                                 | <b>Coefficient</b> |
|--|--------------------|
| Standardised mortality ratio (under 75)                      | 0.1619             |
| Proportion of pensionable age living alone                   | 0.0765             |
| Proportion of dependents in single carer households          | 0.0436             |
| Proportion of economically active who are unemployed         | 0.0287             |
| Standardised limiting long-standing illness ratio (under 75) | 0.2528             |
| <b>Psychiatric needs variable</b>                            |                    |
| Standardised mortality ratio (under 75)                      | 0.2426             |
| Proportion of pensionable age living alone                   | 0.3609             |
| Proportion of dependants with no carer                       | 0.1431             |
| Proportion of adult population permanently sick              | 0.2616             |
| Proportion of persons in lone parent families                | 0.1846             |
| Proportion born in New Commonwealth                          | 0.1073             |
| <b>Community mental illness needs variables</b>              |                    |
| Standardised mortality ratio (under 75)                      | 0.519              |
| Residents with no car  | 0.128              |
| Single, widowed or divorced                                  | 0.800              |
| Single parent households                                     | 0.130              |
| <b>Non-psychiatric community needs variables</b>             |                    |
| <i>District nursing</i>                                      |                    |
| Standardised mortality ratio (under 75)                      | 0.424              |
| Residents with no car  | 0.263              |
| Households with 3 or more children                           | 0.142              |
| <i>Health visiting</i>                                       |                    |
| Residents with no central heating                            | 0.088              |
| Elderly living alone   | 0.172              |
| Single parent households                                     | 0.069              |

|   |        |
|---|--------|
| Dependents in no carer households       | 0.169  |
| <i>Community maternity</i>              |        |
| Single carer households                 | 0.265  |
| <i>Chiropody</i>                        |        |
| Standardised mortality ratio (under 75) | 0.725  |
| Residents with no car                   | 0.108  |
| Born in New Commonwealth                | 0.139  |
| Educational qualifications              | -0.115 |
| <i>Other community health</i>           |        |
| Residents with no car                   | 0.108  |
| Single, Widowed or divorced             | 0.532  |

Note: the New Commonwealth consists primarily of Britain's former colonies in the Indian Subcontinent, East Africa, and The West Indies. Further, the data used to estimate the coefficients for the community health services is inferior to that used to estimate the other coefficients. This will be improved over time.

*Source: Oliver Adam J, "Risk Adjusting Health Care Resource Allocations"*

## APPENDIX G – Northern Ireland : Weightings

### POC 1: Acute Services

**Table G1: Acute Age/ Gender Relative Costs**

|            |              |              |              |              |              |              |              |              |              |
|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>Age</b> | <b>0-4</b>   | <b>5-9</b>   | <b>10-14</b> | <b>15-19</b> | <b>20-24</b> | <b>25-29</b> | <b>30-34</b> | <b>35-39</b> | <b>40-44</b> |
| Male       | 270.4        | 79.1         | 70.2         | 79           | 88           | 98.2         | 102.3        | 109.6        | 120.6        |
| Female     | 205.4        | 63.7         | 61.1         | 78.1         | 93           | 113.2        | 122.8        | 125.9        | 139.1        |
|            |              |              |              |              |              |              |              |              |              |
| <b>Age</b> | <b>45-49</b> | <b>50-54</b> | <b>55-59</b> | <b>60-64</b> | <b>65-69</b> | <b>70-74</b> | <b>75-79</b> | <b>80-84</b> | <b>85+</b>   |
| Male       | 153          | 202.2        | 261.9        | 350.3        | 456.4        | 525.4        | 602.2        | 684.1        | 831.6        |
| Female     | 156.9        | 185.1        | 217.8        | 260.5        | 324.8        | 389          | 448.5        | 517.5        | 568.9        |

*Source: CFRG, “Allocating resources to health and social services boards”*

**Table G2: Northern Ireland’s Acute Needs Index**

| <b>Acute Health Care Needs Variable</b> | <b>Coefficient</b> |
|---|--------------------|
| Over 75 Living Alone                    | 0.1076             |
| Family Credit (Not)                     | -2.1947            |
| Income Support                          | 0.0788             |
| SMR (All Ages)                          | 0.2712             |
| Low Birth Weight                        | 0.0513             |

*Source: CFRG, “Allocating resources to health and social services boards”*

Note that the “Family Credit” variable represents the population **not** getting family credit. This was done in order to avoid getting zeros for this variable in certain areas. Further, SMR is the Standardised Mortality Ratio for all ages.

(CFRG, “Allocating resources to health and social services boards”)

### POC 2: Maternity & Child Health

Note that the base age is 25. Thus, a woman under 25 giving birth to a child of normal weight would have an expected hospitalisation of 3.517 days (i.e. the constant). The other variables are added or subtracted from the model according to the relevant circumstances. For example, if the mother was aged 35-39, and it was her second child, the expected value would be:  $3.517 + 0.898 - 1.477 = 2.938$ .

The second part of the Needs Index is for Community Child Health Services. This is simply calculated by weighting the population aged 0-4 with the “SMR under 75,” and applying this to 30% of the child services.

**Table G3: Maternity Inpatient Model**

| <b>Maternity Inpatient Model Variables<br/>(Unweighted Bed-Days)</b> | <b>Coefficients</b> |
|--|---------------------|
| Constant   | 3.517               |
| Age 25-29  | 0.312               |
| Age 30-34  | 0.609               |
| Age 35-39  | 0.898               |
| Age 40+  | 0.973               |
| Low Birthweight baby (Yes or No)                                     | 7.152               |
| Previous Births (Yes or No)  | -1.477              |
| Multiple Birth (Yes or No)   | 1.891               |

### **POC 3: Family & Child Care**

**Table G4: Family & Child Care Age/ Gender Weightings**

|        | <b>0-4</b> | <b>5-14</b> | <b>15-17</b> | <b>18-44</b> |
|--------|------------|-------------|--------------|--------------|
| Male   | 1          | 1.5         | 2.9          | 0.1          |
| Female | 1          | 1.1         | 2.8          | 0.1          |

**Table G5: Family & Child Care Needs Index**

| <b>Variable</b>   | <b>Coefficient</b> |
|---|--------------------|
| Proportion of children aged 0-15 <b>without</b> a limiting long-term illness                                      | -9.479             |
| Proportion of dependant children aged 0-18 who are <b>not</b> living in social rented housing                     | -3.693             |
| Proportion of families with dependant children where the head of the household is a lone parent on income support | 0.691              |

## POC 4: Elderly Care

**Table G6: Elderly Care Age/ Gender Weightings**

|        | 65-74 | 75-84 | 85+  |
|--------|-------|-------|------|
| Male   | 1.0   | 3.4   | 8.4  |
| Female | 1.1   | 4.5   | 11.5 |

**Table G7: Elderly Care Needs Index**

| Variables  | Coefficient |
|--|-------------|
| SMR <65  | 0.152       |
| SMR 65-74  | 0.292       |
| Standardised limiting long-term illness aged 75+ | 0.252       |
| Proportion of pensioners aged 85+                | -0.210      |

(Where SMR is the Standardised Mortality Ratio for the relevant age group)

## POC 5: Mental Health

**Table G8: Mental Health Age/ Gender Weightings**

|        | 0-4 | 5-14 | 15-44 | 45-64 | 65-74 | 75-84 | 85+ |
|--------|-----|------|-------|-------|-------|-------|-----|
| Male   | 0.0 | 0.2  | 1     | 1.5   | 1.6   | 1.6   | 1.4 |
| Female | 0.0 | 0.2  | 0.9   | 1.3   | 1.6   | 1.8   | 2.1 |

**Table G9: Mental Health Needs Index**

| Variable   | Coefficient |
|--|-------------|
| Age-standardised sickness ratio                        | 0.35        |
| Proportion of households without 2 cars                | 1.229       |
| Proportion of working age population who are students  | 0.227       |
| Proportion of families not in receipt of Family Credit | -1.11       |

## POC 6: Learning Disability

Table G10: Learning Disability Age/ Gender Weights

|        | 0–4 | 5-14 | 15-44 | 45-64 | 65-74 | 75–84 | 85 + |
|--------|-----|------|-------|-------|-------|-------|------|
| Male   | 1   | 2.8  | 7.1   | 7.9   | 3.5   | 2.5   | 1.3  |
| Female | 0.7 | 2.2  | 5.5   | 6.7   | 2.6   | 1.5   | 3.2  |

The *interim* needs index for Learning Disability is based on the following variables:

- Standardised Mortality Ratio (under 75)
- Number of learning disability clients who had at least one contact with Providers

This index will be updated as data becomes available (it is currently based on English data).

## POC 7: Physical & Sensory Disability

Table G11: Physical & Sensory Disability Age Weighting

| Age Band | 0-15 | 16-49 | 50-64 |
|----------|------|-------|-------|
| Weight   | 1.0  | 1.2   | 4.5   |

The *interim* needs index is based on the Standardised Mortality Ratio (under 75). This index will also be updated.

## POC 8: Health Promotion & Disease Prevention

No specific age/gender adjustment is made for this POC. Instead, resources are allocated with each age group (and gender) having equal weighting.

The *interim* needs index is merely the Standardised Mortality Ratio (under 75).

## POC 9: Primary Health & Adult Community

Again, no specific age/gender adjustment is made for this POC. However, the ages considered are limited (16 – 64), with equal weighting given to all ages within this group. The Standardised Mortality Ratio (under 75) is again used as the interim needs index.

## APPENDIX H – Scotland’s age/sex weights

**Table H1: Age/sex weights for Hospital Services excluding Maternity**

| <i>Cost per person (£)</i> |         | Age Bands |        |        |        |        |        |         |         |
|----------------------------|---------|-----------|--------|--------|--------|--------|--------|---------|---------|
|                            |         | 0-4       | 5-14   | 15-24  | 25-44  | 45-64  | 65-74  | 75-84   | 85+     |
| <b>Acute</b>               | Males   | 349.22    | 119.21 | 110.08 | 141.18 | 332.58 | 756.91 | 1232.45 | 1846.34 |
|                            | Females | 260.67    | 104.44 | 129.17 | 175.24 | 301.08 | 595.49 | 1043.01 | 1661.87 |
| <b>Mental Illness</b>      | Males   | 2.60      | 9.68   | 28.80  | 49.08  | 60.85  | 142.83 | 353.00  | 791.04  |
|                            | Females | 1.27      | 6.46   | 24.15  | 37.26  | 44.72  | 131.42 | 349.18  | 904.70  |
| <b>Care of the Elderly</b> | Males   | 0         | 0      | 0.24   | 1.57   | 12.19  | 66.80  | 235.79  | 441.81  |
|                            | Females | 0         | 0      | 0.28   | 1.62   | 11.24  | 74.21  | 325.09  | 787.10  |
| <b>Learning Disability</b> | Males   | 0.81      | 1.61   | 9.59   | 34.89  | 33.49  | 23.84  | 27.32   | 32.93   |
|                            | Females | 0.25      | 1.27   | 6.18   | 22.20  | 26.65  | 23.14  | 21.00   | 14.89   |
| <b>Community</b>           | Males   | 114.93    | 53.74  | 54.59  | 54.50  | 51.30  | 78.28  | 191.40  | 197.24  |
|                            | Females | 113.93    | 52.14  | 63.86  | 62.81  | 50.41  | 78.73  | 192.99  | 197.80  |

**Table H2: Age/sex weights for Maternity**

| <i>Cost per birth (£)</i> | Age Bands |       |       |       |       |       |       |
|---------------------------|-----------|-------|-------|-------|-------|-------|-------|
|                           | 15-19     | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 |
| <b>Maternity</b>          | 2371      | 2121  | 2025  | 2000  | 2160  | 2462  | 2930  |

**Table H3: Age/sex weights for GP Prescribing**

| <i>Cost per person (£)</i> |         | Age Bands |       |       |       |        |        |        |        |
|----------------------------|---------|-----------|-------|-------|-------|--------|--------|--------|--------|
|                            |         | 0-4       | 5-15  | 16-24 | 25-44 | 45-59  | 60-64  | 65-74  | 75+    |
| <b>GP Prescribing</b>      | Males   | 21.65     | 29.48 | 21.81 | 40.51 | 107.51 | 107.51 | 199.36 | 251.14 |
|                            | Females | 20.88     | 26.41 | 46.07 | 57.69 | 133.69 | 190.61 | 184.17 | 235.10 |

**Table H4: Age/sex weights for General Medical Services (GMS)**

| <i>Consultations per person</i> |         | Age Bands |      |       |       |       |       |       |     |
|---------------------------------|---------|-----------|------|-------|-------|-------|-------|-------|-----|
|                                 |         | 0-4       | 5-14 | 15-24 | 25-44 | 45-64 | 65-74 | 75-84 | 85+ |
| <b>GMS</b>                      | Males   | 5.0       | 2.0  | 1.8   | 1.9   | 2.8   | 4.1   | 4.8   | 4.2 |
|                                 | Females | 4.5       | 2.2  | 3.8   | 4.0   | 4.2   | 4.5   | 4.8   | 4.4 |

(Scottish Executive Health Department, “Fair shares for all technical report”)