

PROTECTION INSURANCE AND FINANCIAL WELLBEING

A Report for the Financial Services Research Forum

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Thomas Hobbes: The Benefits of Security

"Whatsoever therefore is consequent to a time of war, where every man is enemy to every man; the same is consequent to the time, wherein men live without other security, than what their own strength, and their own invention shall furnish them withall.

In such condition, there is no place for industry; because the fruit thereof is uncertain; and consequently no culture of the earth; no navigation, nor use of the commodities that may be imported by sea; no commodious building; no instruments of moving, and removing such things as require much force; no knowledge of the face of the earth; no account of time; no arts; no letters; no society; and which is worst of all, continual fear, and danger of violent death - and the life of man, solitary, poor, nasty, brutish, and short."

Thomas Hobbes, *Leviathan*, 1651

Thomas Hobbes, 1588 - 1679



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0. Brief Summary

The factors that influence the demand for protection against personal risks to life, health and financial wellbeing are not much researched or understood. This is an important knowledge gap – since it coincides with considerable apparent underinvestment by the U.K. households in insurance, precautionary saving and other coping mechanisms that would alleviate the distress such risks can cause.

This paper has a number of objectives. First and foremost, we want to set out what is known about consumer decision-taking relating to the risks of ill-health, injury and death (the ‘wellbeing’ risks). Only by appreciating consumer motivations can we then understand why there is a protection gap. Second, we introduce some more precise terms and definitions which will improve the dialogue on risk and protection issues. Third we attempt to make the concepts and ideas relevant to the current protection market, including suggesting ways in which risk attitude questionnaires and fact-finds may be improved. Finally we suggest areas where it is important to undertake further primary research.

The paper has four main themes. First, it attempts to review the actual level of wellbeing risk that typical individuals face in relation to injury, illness and death from all causes. This turns out to be quite a difficult task. Although there is a plethora of information about risk from specific causes (injury at work, cancer, stroke, etc) – there is rather less about their combined omnibus effect. The resultant figures are surprisingly high: the risk that a typical adult in the U.K. will either die or suffer a serious illness or injury is around 10% for the age range 25-34, 14% for 35-44, and 16% for 45-54.

Secondly, the paper asks how we could measure the strength of an individual’s desire to protect against wellbeing risks. This desire has a number of separate dimensions including the willingness to pay to improve the quality of life (which we term ‘vitality’), the willingness to pay a risk premium to reduce the risk of income fluctuations (‘risk aversion’), and the motivation behind precautionary saving (‘prudence’). Our findings represent, perhaps, the most important practical contribution of the paper since they suggest enhancements to standard risk profile questionnaires and fact-files used to measure client risk attitudes.

Thirdly, we attempt to review the existing research which explores protection insurance and precautionary saving. We are particularly interested in the factors that motivate these behaviours and the inter-relationship between protection and saving. This has obvious relevance for savings institutions and insurance companies: are their products substitutes and therefore in competition with one another, or complements? The fact that many people save for precautionary reasons is also relevant to personal financial planning decisions, since this saving is distinct from those other motivations - such as saving to distribute spending to the future (including to fund retirement), saving for a bequest, and saving to earn returns (often termed ‘investment’).

Finally, we try to summarise the possible reasons for the existence of the protection gap (the under-investment in financial security). There is a wide range of possible candidates including a lack of desire for protection, information asymmetries, a lack of information about risk and/or products and their prices, and behavioural factors. More work will need to be done before we know the most likely culprits, and the key questions are set out in the concluding section.

PROTECTION INSURANCE AND FINANCIAL WELLBEING

1. INTRODUCTION

All human beings are exposed to risk, in the sense that they may experience unexpected and adverse outcomes which were not anticipated and cannot be fully controlled. It is important to investigate consumer decision-taking relating to the risk of ill-health, injury and death – not least so that consumer attitudes to such wellbeing risks can be better understood and measured (for example, using risk attitude questionnaires and fact-finds) and then managed using appropriate insurance and saving products.

This paper will focus on three types of personal risk which can affect our financial position and quality of life – our wellbeing. In many cases, all three wellbeing risks may occur at the same time. In the first case, we are exposed to the possibility of pain, suffering, ill-health and premature death: this has the effect of shortening our life expectancy and reducing the quality of life irrespective of any financial impact. Secondly, our current incomes may fluctuate (perhaps because of unemployment, or an accident or illness which reduces our income-earning capacity) – which may mean that we cannot make precise plans on how to spend this income to best advantage¹. Thirdly, our future income may fluctuate so that longer-term spending plans may not be fulfilled.

The extent to which an individual is prepared to pay to control or finance these risks depends, of course, on her risk attitudes. However the theory underpinning individual risk-taking indicates that an individual's attitude towards risk is not necessarily the same across the three types of wellbeing risk². For example, although it seems intuitive, there is no automatic reason why an individual who is worried about the volatility of current income (that is, someone who is 'risk averse') would also be inclined to save for precautionary reasons because of uncertainty about future income. Similarly, just because someone is not

¹ Other types of risk, such as damage to property or increase in liabilities which then require an increase in spending, are essentially the same as income risk – since they expose our 'residual income' (that is, the income remaining after the increased expenditure has been incurred) to volatility.

² Since the strength of the desire to control such risks depends on different characteristics of the individual's utility function (namely vitality, risk aversion and prudence – see Section 4 below).

particularly concerned about the risks of ill-health (who is a smoker perhaps) does not necessarily mean that they will have low levels of risk aversion. In addition, behavioural factors such as loss aversion may also affect the risk attitudes of many individuals. All this suggests that the measurement of individual attitudes to risk (for example, in financial planning fact finders and risk profile questionnaires) can be a complex and sophisticated task³.

The insurance industry thinks that individuals in the U.K. are not protecting themselves as much as they should against these wellbeing risks (Association of British Insurers, 2008; Swiss Re 2007). This ‘protection gap’ arises because the amount of cover individuals require to maintain their incomes if they are killed or unable to work is substantially lower than the cover actually purchased plus liquid assets. In other words, the demand for insurance protection is too low. The protection gap, which was first estimated in 2002 at £2000 billion, increased to £2300 billion in 2007 (Swiss Re, 2007). Unfortunately, the size of the gap does not reflect our understanding of its cause. The paper investigates several issues relating to the demand for protection including:

- What is the size of the major wellbeing risks that individuals face?
- How do individuals protect against these risks?
- Why do individuals prefer one method to another?
- How does the protection market contribute towards providing adequate cover?
- What are the behavioural factors that influence an individual’s protection decisions?
- Why do people under-invest in personal protection?

It is not the purpose of this paper to report on primary research: we are more concerned to review existing work, identify the gaps in knowledge (which appear to be considerable) and set out a research agenda so that these gaps might be filled. There is very little existing empirical research in the area of household demand for protection against risks to life and health, and many of the drivers for such demand are extremely difficult to measure. The drivers of demand for protection insurance and precautionary saving need to be understood,

³ Thus it will definitely not be sufficient to ask a question such as “What is your attitude towards taking risk – low/cautious, medium, or high/adventurous?” without specifying the type of wellbeing risk more precisely.

since the most likely reason for the existence of a protection gap is that U.K. residents do not have a strong demand for protection⁴.

This scoping paper is structured as follows: Section 2 provides an overview of wellbeing risks, and the methods of protecting them. Section 3 reviews briefly the U.K. protection market, explores the protection gap and discusses several market failures and anomalies. Section 4 highlights several concepts regarding individuals' risk-taking behaviour, drawing on concepts from the behavioural economics and finance literature. Section 5 discusses the differences between the two main methods of protection – insurance and precautionary savings, presents a brief review of past research, and asks if insurance and precautionary savings are complements or substitutes. Finally, Section 6 highlights the gaps in knowledge that exist, followed by recommendations for further research.

⁴ Although it may also be due to the measurement problems involved – particularly the assumption that individuals invest their precautionary savings in liquid assets.

2. OVERVIEW OF WELLBEING RISKS AND PROTECTION SOLUTIONS

2.1 Wellbeing Risks

The world may have improved immeasurably since 'Thomas Hobbes' pessimistic comments about the consequences of a lack of security in 1651 (see p4 above), but the risks to life and health are with us still. Typical headline statistics for these risks today in the U.K. are provided in Box 1. However although the publication of such information by charitable organizations is designed to encourage citizens to improve their lifestyle, it also produces confusion because it only provides a partial picture⁵. The analysis of the incidence of wellbeing risks is broken down into three sections: death/mortality risk, injury and sickness, and unemployment.

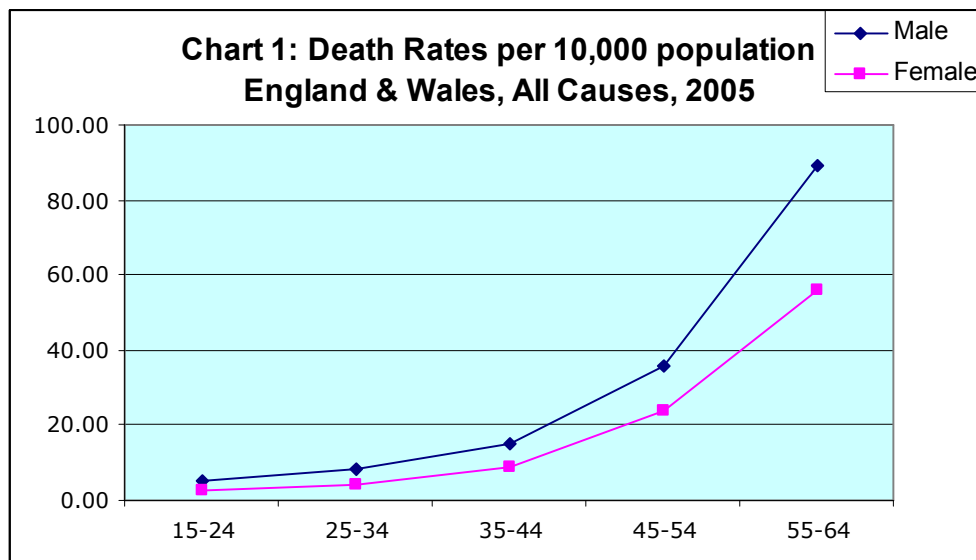
Box 1: The Headline Statistics

Heart and circulatory disease (U.K.'s No.1 killer)	Stroke (U.K.'s No.2 killer)
In the U.K., someone has a heart attack every 2 minutes, and nearly 2.6 million people have coronary heart disease (5½% of adult population) (British Heart Foundation, 2005)	Every 5 minutes someone in the U.K. has a stroke, equivalent to 150,000 people each year. A quarter of the population unknowingly suffer from undiagnosed high blood pressure - the single biggest risk factor for stroke (The Stroke Association, 2007)
Cancer	Disability
Each year more than 250,000 people are newly diagnosed with cancer. One in three people will develop some form of cancer during their lifetime. (Cancer Research U.K., 2006)	More than 2 million people in the U.K. are unable to work due to accident or sickness (4% of adult population) (Office for National Statistics)

⁵ For example, the combined affect of these high-profile risks, and the impact of other health risk and of accidents is largely ignored.

Incidence of death

While the U.K. population is subject to the risks of injury, disease and death, the probability of these events occurring varies across age and gender. This point is illustrated in Chart 1, which shows the latest average death rates per 10,000 persons exposed for England and Wales in 2005 by age range. The chart shows that the probability of death from all causes for men rises from 0.05% at ages 15-24 to 0.89% for 55-64: thereafter, the mortality rises steeply to 2.40% for ages 65-74, and 6.74% for 75-85. The corresponding rates for women are lower at every age: starting at 0.02% for 15-24 and rising to 0.56% for 55-64, 1.54% for 65-74 and 4.81% for 75-85.



Source: Office of National Statistics, 2006

Table 1 provides a breakdown of the causes of death in England and Wales in 2005 by age grouping. For women of age 25 and over, neoplasms (cancer) and heart and circulatory diseases are the major causes of death.

For men up to the age of 44, accidents are the most likely cause of death (including accidents, road accidents, falls, poisoning, and self-harm), although the risk of accidental death does not appear to vary much by age. After the age of 45, cancer and heart and circulatory diseases take over as the major causes of male death.

Table 1: Selected causes of deaths, by sex and age 2005
England & Wales, Rates per 10,000

Male								
Age	All	Infectious diseases	Cancer	Nervous system	Circulatory diseases	Respiratory diseases	Digestive diseases	Accidents - all
15-24	5.24	0.06	0.47	0.39	0.28	0.11	0.06	3.23
25-34	8.23	0.17	0.84	0.36	0.90	0.24	0.40	3.92
35-44	15.09	0.36	2.66	0.66	3.45	0.56	1.79	3.96
45-54	35.89	0.50	10.66	1.09	10.94	1.92	4.58	3.90
55-64	89.06	0.78	36.32	2.04	29.61	6.93	6.36	3.40
Female								
Age	All	Infectious diseases	Cancer	Nervous system	Circulatory diseases	Respiratory diseases	Digestive diseases	Accidents - all
15-24	2.42	0.06	0.42	0.21	0.19	0.12	0.08	0.94
25-34	4.02	0.16	1.08	0.27	0.43	0.13	0.26	1.02
35-44	9.04	0.16	3.83	0.4	1.35	0.35	0.93	1.15
45-54	23.76	0.31	11.99	0.91	3.99	1.27	2.44	1.48
55-64	56.15	0.46	30.56	1.74	10.8	4.69	3.5	1.55

Source: Office of National Statistics, 2006

Incidence of Injury and Sickness

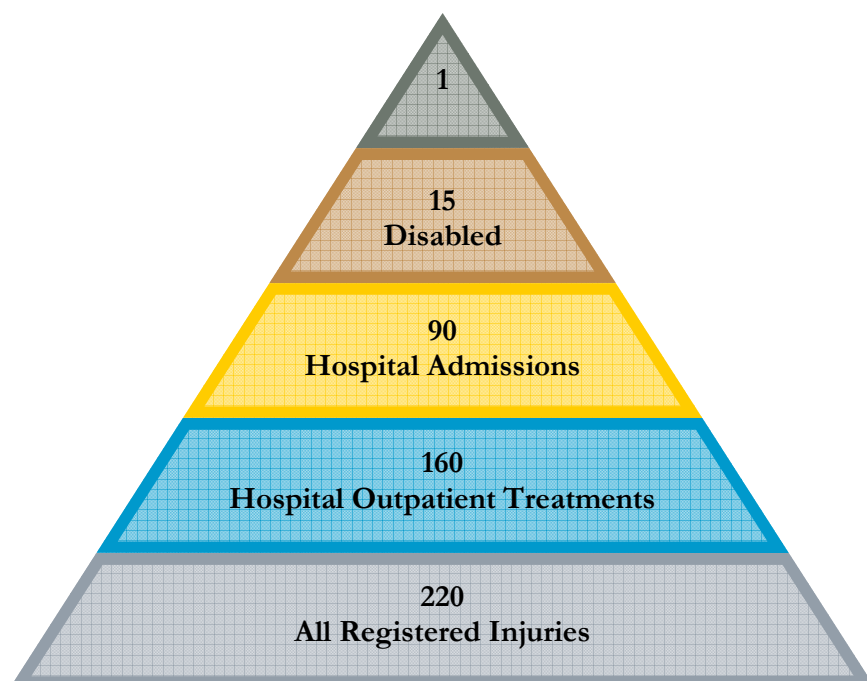
Of course, the figures for deaths do not provide a complete picture of the impact of personal risk, and it is necessary to supplement these with data on the risk of illness and injury. Recent analysis of European Union injury rates indicates that for every fatal accidental injury, there are further disabling injuries, hospital admissions, hospital outpatient treatments and other registered injuries – which can be represented as a Heinrich triangle (see Chart 2). The chart suggests that for every fatal injury reported in the European Union, there are 15 disabling injuries and 90 injuries serious enough to warrant hospital admission. There are also 360 less-serious injuries; including 160 requiring hospital outpatient treatment and another 200 other non-fatal registered injuries (Eurosafe, 2006). This suggests that the projected pattern for serious and less-serious injury in England and Wales might be as outlined in Table 2.

**Table 2: Projected injury rates^a and serious sickness rate,
(male and female combined) by age, 2005
England & Wales, Rates per 10,000**

Age	Serious Injury (causing disability and/or hospital admission)	Less-serious injury (hospital outpatient treatment and other)
15-24	250	850
25-34	150	510
35-44	90	300
45-54	90	300
55-64	140	480

a. {Fatal accident rate of Table 1 (male + female) *less* fatalities due to self-harm}
times Heinrich factor.

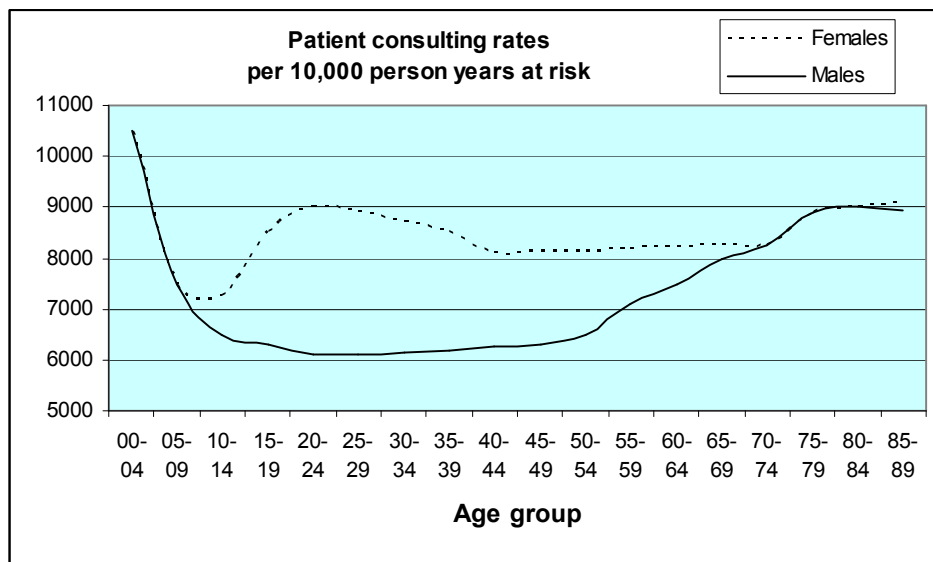
Chart 2: The EU Heinrich Injury Triangle (Ratio of injuries per 1 death)



Source: Eurosafe (2006, p12)

Further insight into the incidence of injury (from all causes) and of non-fatal illnesses and disease can be obtained from U.K. National Health Service records, although the most recent publicly-available data is from a survey conducted in 1991-1992⁶. A detailed analysis of the overall incidence of morbidity (that is, short- and long-term illness and injury) from all causes can be obtained from the decennial surveys of the rate at which people consulted with their local General Practitioner in England and Wales. The resulting patient consulting (morbidity) rates illustrate the number of patients who consulted their doctors at least once for a condition or groups of conditions, per 10,000 people exposed to risk⁷.

Chart 3: Morbidity Rates, All Causes, England & Wales, 1991-92



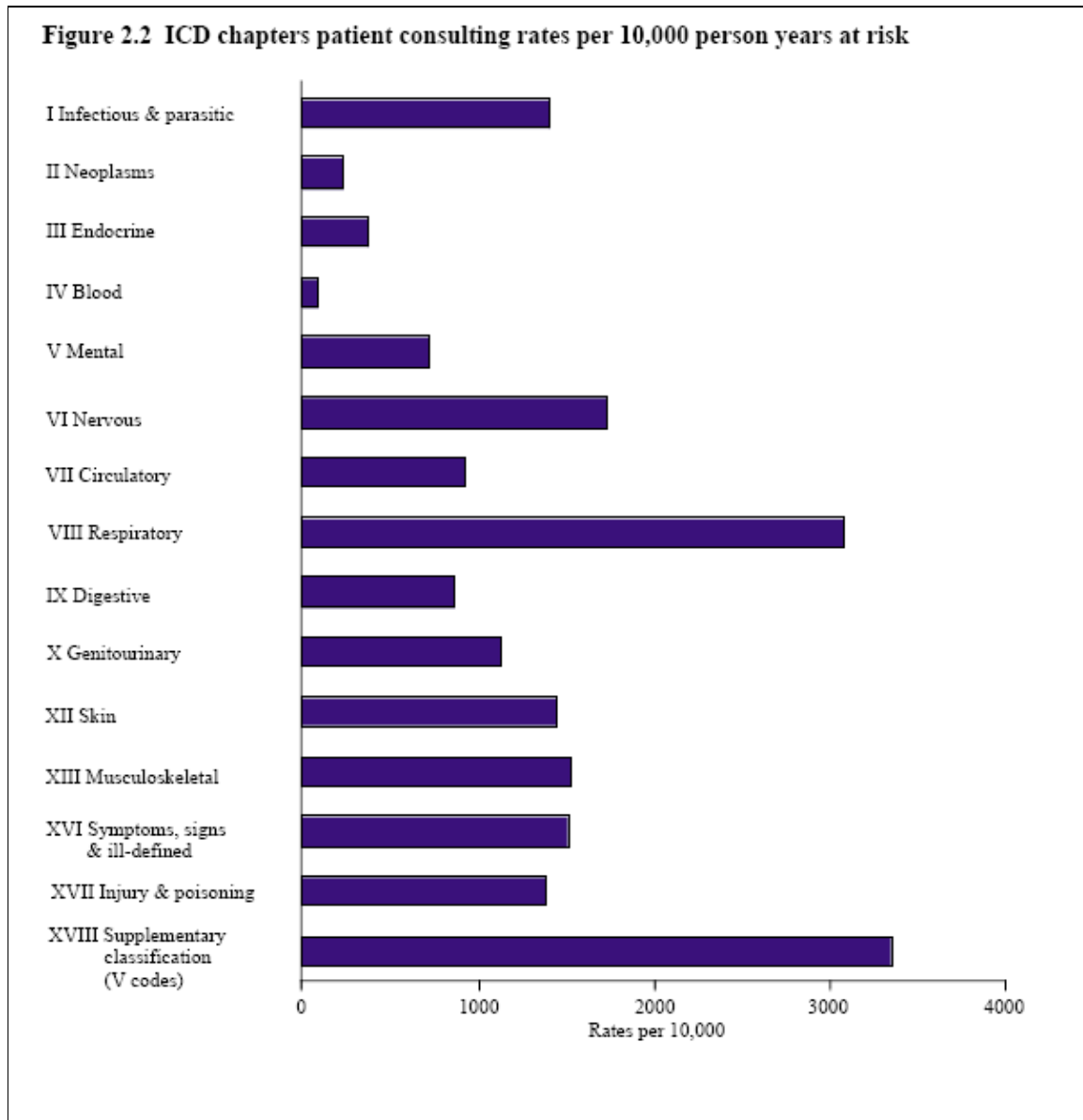
Source: Office of Population Censuses and Surveys (1995, p25)

Chart 3 shows the all-cause morbidity rate (per 10,000 persons exposed) for males and females by age. For men and women for working age, the typical rate of illness or injury (sufficiently serious to warrant a consultation with a doctor) is around 65% for men and 85% for women per annum. The breakdown by types of illness of injury is provided in Chart 4, which shows that respiratory complaints is the most important single source of illness.

⁶ Note that Chart 6 below suggests that the rates of long-standing illness in the U.K. population have not improved much over the last 15 years.

⁷ The figures are adjusted to allow for repeated visits for the same condition (Office of Population Censuses and Surveys, 1995)

Chart 4: The Main Sources of Morbidity, England and Wales, 1991-1992



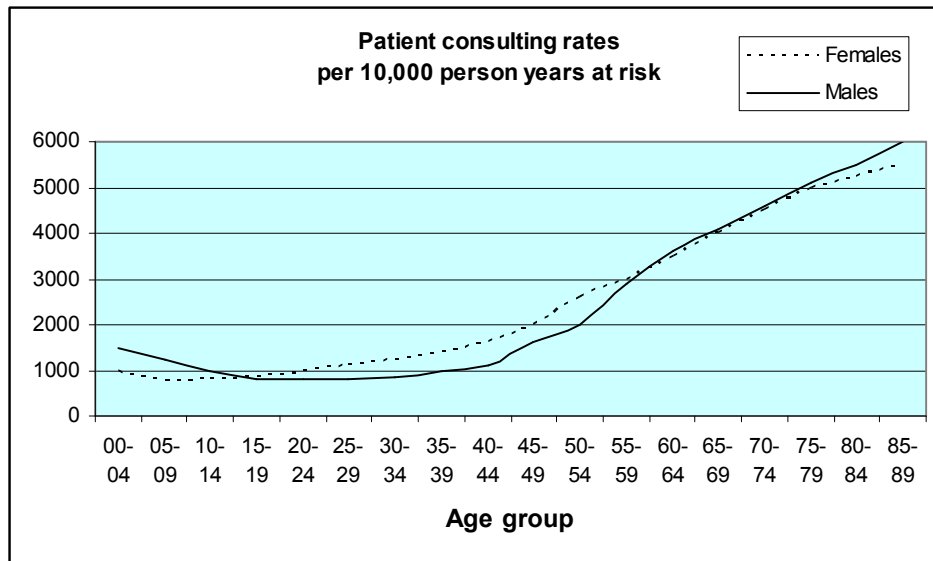
Source: Office of Population Censuses and Surveys (1995, p26)

The study of GP consultation rates also provides a breakdown of the severity of illness of injury, and Chart 5 shows the pattern of the most severe conditions by age and gender⁸. The risk of serious injury appears to be very similar for women and men: those in their 20s and

⁸ The category 'Serious disease and conditions' is defined as "Invariably or frequently serious or possibly life threatening, *or* Invariably or frequently requiring major surgery or intensive care, *or* With a high probability of serious complications or significant disability". The --- line represents female the rate.

30s have around a 10% chance of suffering a serious injury or illness in a given year, rising to 40% by the age of 65.

Chart 5: The Incidence of Serious Diseases and Conditions, England and Wales, 1991-1992

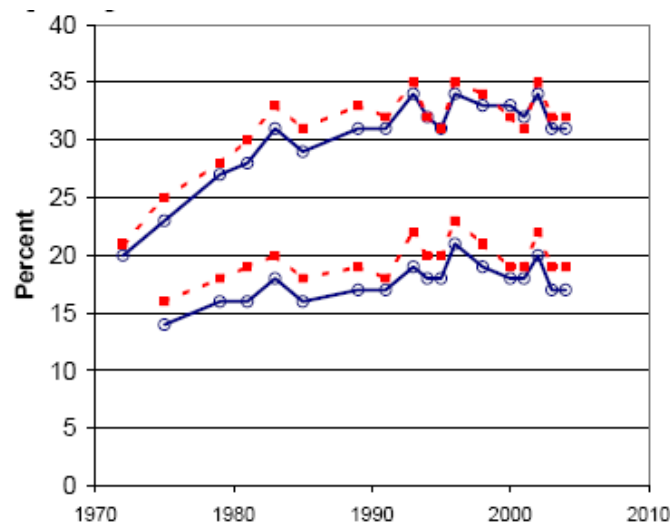


Source: Office of Population Censuses and Surveys (1995, p26)

It is tempting to compare the incidence rates for serious diseases and conditions of Chart 5 with the estimated serious injury rates of Table 2 – since the difference should be due to the inclusion of serious ill-health and long-term illness (as opposed to injury) in the GP consultation data. Assume that the respective definitions of ‘serious’ are broadly equivalent, and that there was no improvement in morbidity⁹ over the 13 years to 2005, as broadly confirmed by the proportion of the population reporting long-standing and limiting illness in the U.K.’s General Household Survey (Chart 6). The resulting estimates for the prevalence of serious illness rates in England and Wales in 2005 are included in Table 3: the chance of serious sickness in any one year appears to increase from 7.5% for ages 15-24, to 29% in the age range 55-64.

⁹ Note the Office of Population Censuses and Surveys also reported that the prevalence of serious diseases *worsened* between 1982 and 1992 based on consultation rates.

Chart 6: The Proportion of the U.K. Population Reporting Long-standing Illness in the General Household Survey*



* The upper pair of lines denotes longstanding illness, while the lower pair reflects long-standing illness which limits the person's activities. The --- denotes females.

Source: West Midlands Public Health Observatory (2007)

Death, Injury and Sickness Combined

A summary of the estimated risks arising from death, serious injury and serious sickness in England and Wales in 2005, for males and females combined, is provided in Table 3. The projections in the table suggest that the chance that a typical man or woman will either die or suffer a serious illness or injury sometime is around 10% for the age range 25-34, 14% for 35-44, 16% for 45-54 and 31% for 55-64¹⁰.

**Table 3: Projected death, serious injury, and serious sickness rates, (male and female combined) by age, 2005
England & Wales, Rates per 10,000**

Age	Death	Serious Injury	Serious Sickness	Total
15-24	4	250	750	1004
25-34	6	150	850	1006
35-44	12	90	1300	1402
45-54	30	90	1500	1620
55-64	75	140	2900	3115

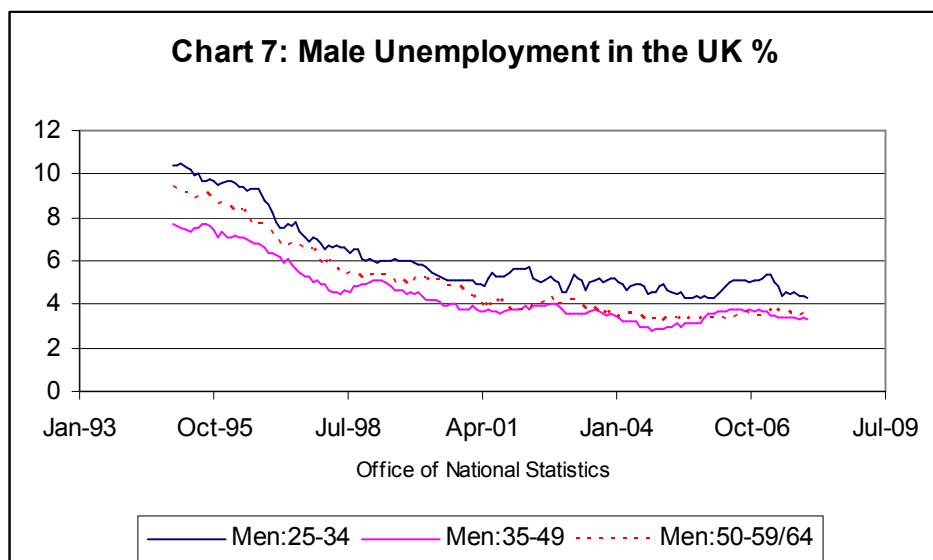
¹⁰ Note that around 18% of individuals in Chart 6 reported a long-standing and limiting illness in 2005.

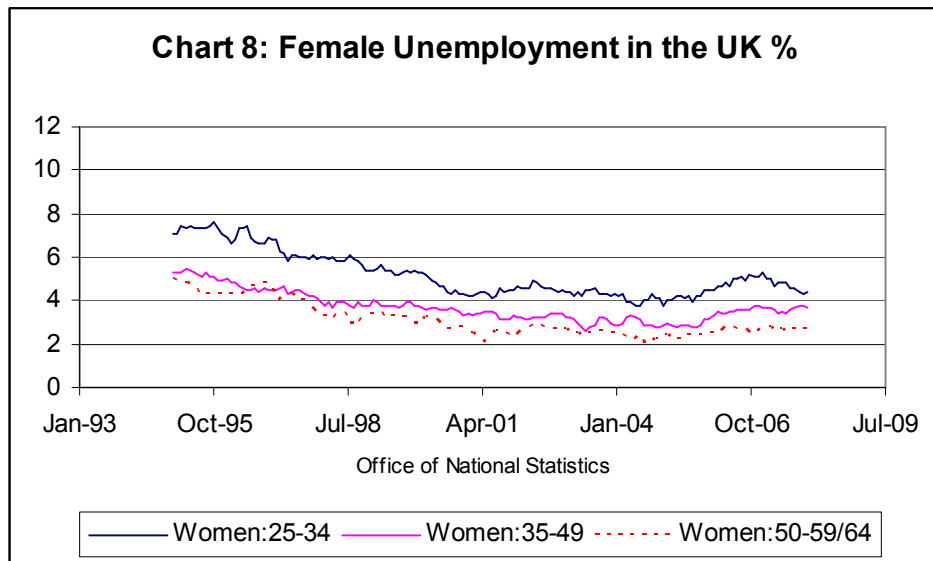
Incidence of Unemployment

Apart from the risks of illness and injury, individuals are also subject to other types of risks that have major financial implications. Income risks due to unexpected fluctuations in income that may occur in the future due to the risks mentioned above (life and health risks) or any other unanticipated occurrences such as unemployment that may affect earning power and cause disruptions to existing financial affairs.

Figures on the risk of unemployment in the U.K. are produced on a seasonally-adjusted monthly basis by the Office of National Statistics, based on the Labour Force Survey. People are defined as unemployed if they are out of work, have actively sought work in the last four weeks and are available to start work in the next two weeks (or who are out of work but have found a job and are waiting to start it in the next two weeks). The unemployment rate is expressed as the number of unemployed as a percentage of the number of economically active persons in that age group.

Charts 7 and 8 show the average unemployment rates for men and women in the U.K. for ages 25-34, 35-49, and 50 to retirement age between January 1995 and December 2007. Of course, the rates also vary considerably according to industry, region, and by the duration of unemployment.





The charts show that the unemployment rate is currently around 4% for men and 3.5% for women. The rate has been falling steadily since 1994. Younger men and women have a higher incidence of unemployment, so the rate at the end of 2007 was 4.3% for men aged 25-34, whereas it was 3.3% for older men between 35 and 49. The survey conducted by the Association of British Insurers (2008) showed that almost one-quarter of respondents had experienced unemployment at some time in their working careers.

2.2 Protecting against the financial impact of wellbeing risks

The grievances caused by the abovementioned risks not only entail physical and emotional suffering, but other accompanying distress, such as the financial impact on individuals and their families. Given this issue, what measures can be taken to mitigate the financial impact of these risks? The parallels from the corporate risk management literature suggest that individuals and households have three main alternatives: (1) reduce the risk, by reducing either the likelihood of an adverse event or the severity of any consequences (both financial and in terms of reductions in quality-adjusted life expectancy), (2) protect using insurance, and/or (3) provide additional liquidity, through precautionary saving.

Personal risk management

The first element involves a programme of personal risk management to assess, report and treat the impact of risk on the individual household – a process which can be illustrated

using the standard risk assessment profile based on the severity and frequency of the risk (see Chart 9). Actions may then be taken to avoid any risks which are otherwise high frequency and high severity (for example, by giving up smoking or extreme sports), or to reduce the severity of financial or physical loss (by having regular health or fitness checks and scans, for example), or to reduce the likelihood of occurrence (perhaps by adopting a healthier lifestyle).

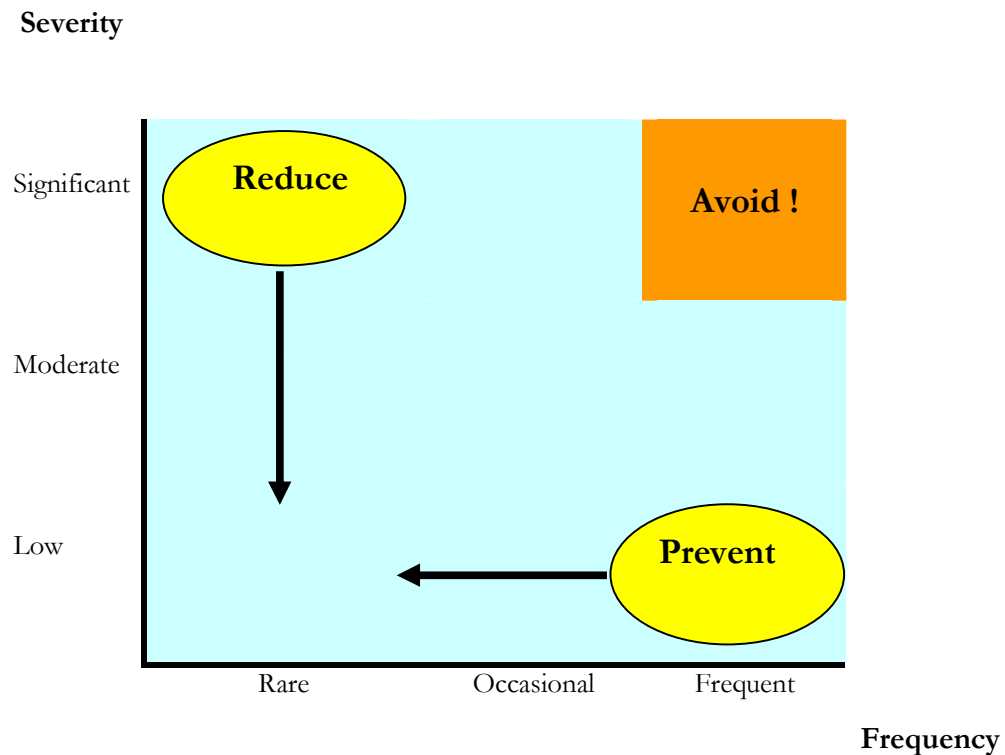
There are numerous examples of personal risk assessment questionnaires and consultations (which are often available for purchase from health insurers) which provide an indication of the risk associated with an individual's health and lifestyle choices. A key problem is the typical individual's lack of information about risk, and risk perceptions which may not match up with the real degree of risk. The contrast between the lack of public information on personal risk¹¹ (of accident, ill-health, and unemployment) is in marked contrast to that on longevity risk and life expectancy, where the United Kingdom Government supplies a substantial volume of information and life expectancy calculators. Clearly, if people had such information they could act to reduce or control the risk by addressing the high-risk factors (diet, exercise, medication in terms of improving health; education and training in terms of reducing the unemployment risk).

An assessment of the severity of the adverse consequences usually focuses on the individual's or household's financial commitments (to provide for dependents, meet increased outgoings, replace lost income etc). Naturally, the financial consequences of personal risk are best dealt with using financial solutions such insurance and saving. However the severity of consequences in terms of personal pain and suffering, and in terms of the reduction of *quality-adjusted life years* is often overlooked in this debate¹². Clearly those with no dependents, whose future medical and care costs are met by the State, should still have a powerful incentive to reduce the risk of injury, illness or death – if they are interested in improving the value of their quality-adjusted expectation of life. The strength of an individual's inclination to allocate income to reduce such risks will be termed their *vitality*.

¹¹ What people really need is information on risk from *all causes*. There appears to be a plethora of risk information by individual cause (stroke, cancer, accident at work etc), but little on the aggregate effect.

¹² For example, in the chapter on 'Managing Personal Risks', a leading textbook says "we turn first to the risk with the greatest potential severity for the individual and the family unit, *the loss of income*." [italics added]. Vaughan and Vaughan (1999) *Fundamentals of Risk and Insurance*, John Wiley, ch 10).

Chart 9: Managing the Risk: Avoidance, Reduction and Prevention



Source: Adapted from Skipper and Kwon (2008, p5)

An assessment of exactly how an individual's quality of life can be degraded by injury, ill-health and death is, of course, rather subjective. However, although they are still the subject of much debate, the techniques to undertake such measurement have been developed by health economists (for example, the EQ-5D¹³) and are widely available (for example see the Office of Health Economics, www.oheschools.org). The basic unit of measurement is the Quality Adjusted Life Year (QALY) which reflects the extent to which an otherwise healthy life is degraded, in terms of the individual's enjoyment of it, by illness or injury. A well-known example is provided in Table 4 (Jones-Lee, 1982), which proposes a QALY of 0.7 (i.e. only 70% of the enjoyment of a normal healthy life year) for an injury or illness which leads

¹³ For further details see www.evidence-based-medicine.co.uk/ebmfiles/WhatisaQALY.pdf

to an inability to undertake any paid employment (irrespective of the financial consequences). The negative figures in the bottom lines of Table 4 reflect states of ill-health that constitute a ‘fate worse than death’.

Table 4. Grading quality of life relative to perfect health (= 1.000)

Disability	Distress	Quality Adjusted Life Year (QALY)			
		None	Mild	Moderate	Severe
No disability		1.000	0.995	0.990	0.967
Slight social disability		0.990	0.986	0.973	0.932
Severe social disability and/or slight impairment of performance at work. Able to do all housework except very heavy tasks		0.980	0.972	0.956	0.912
Choice of work or performance at work very severely limited. Housewives and old people able to do light housework only but able to go out shopping		0.964	0.956	0.942	0.870
Unable to undertake any paid employment. Unable to continue any education. Old people confined to home except for escorted outings and short walks and unable to do shopping. Housewives able only to perform a few simple tasks		0.946	0.935	0.900	0.700
Confined to chair or to wheelchair or able to move around in the house only with support from an assistant		0.875	0.845	0.680	0.000
Confined to bed		0.677	0.564	0.000	-1.486
Unconscious		-1.028			

Source: Jones-Lee (1982), downloaded from Office of Health Economics, www.oheschools.org

Insurance Protection

In addition, individuals can also opt to protect themselves using market insurance. The insurance provides financial resources which can be used to replace lost income (or meet

increased expenditures), and/or to improve the welfare of those who suffer as a result of injury or ill-health¹⁴. The insurance market offers a wide range of contracts which can cover against various health and life risks: permanent health insurance, personal accidents, medical insurance, critical illness and life/annuity insurance. These products can be purchased personally by individuals or alternatively through employment-related benefits (i.e. group protection insurance). An individual's risk aversion is thought to be the primary driver for the purchase of insurance against financial loss¹⁵.

Permanent Health Insurance is a policy designed to provide income should the policyholder be incapable of working due to an illness or accident. Personal Accident plans protect against loss of life or against personal injuries due to accidental causes, and can also include income benefits guaranteeing fixed streams of income in the event of total and permanent disability. Critical illness protection provides cover in the event of specified major illnesses such as heart attacks, cancer, strokes, major organ transplants and other life threatening diseases. Approximately 20% of critical illness cases result in long-term illness.

Medical insurance covers the cost of private medical care such as hospitalization and related medical treatments. Life insurance provides lump sum benefits to surviving beneficiaries as a means of financial security in the event of death of the policyholder. Lastly, annuity plans provide streams of regular income in exchange for a lump sum payment and is usually purchased to supplement retirement income.

There are two main forms of protection-based life insurance – term assurance and whole life policies. Term assurance is cheaper compared with whole life policies, because the contract pays out in the event of death only, or for some policies, death and total and permanent disablement. Whole life insurance policies are more expensive than pure term assurance policies, typically because it has a bequest savings component (which can also be 'borrowed' in times of need, or cashed out in the event the policy matures or is terminated). The market for household protection insurance has been reviewed by the Association of British Insurers (2008).

¹⁴ Since even people who are ill are likely to be made happier by having more money to spend.

¹⁵ Risk aversion will also motivate individuals to incur expenditure to reduce the risk or consequences of financial loss (as opposed to the loss of QALYs as discussed earlier).

Precautionary saving

Precautionary saving arises when people prepare for future uncertainties by setting aside a portion of their current income. According to Abel (1985, p.777) “a precautionary demand for saving arises because an individual consumer does not know in advance the date at which he will die, and he wants to avoid low levels of consumption in the event that he lives longer than expected” – reflecting a method of self-insurance in the face of longevity risk. The literature on precautionary savings also suggests that besides longevity risks, individuals may also save in response to other risks such as income and health uncertainties. In contrast to protection insurance, the primary driver for precautionary saving is the individual’s level of prudence (see Section 4 below), and it is possible for individuals to be prudent (in the sense that they will want to save for precautionary reasons) without being averse to risk.

3. THE U.K. PROTECTION MARKET

3.1 The Supply of Protection

As a basic means for protection, the U.K. population is fortunate to have healthcare services which partly eliminate the need for private health insurance. The National Health Services (N.H.S.) is the main thrust of the health care system in the U.K., and is publicly funded by general taxation (in the form of National Insurance contributions) from the working population. The N.H.S. provides services such as accident & emergency, primary care, in-patient care, and long-term healthcare, which are all generally provided free of charge on demand. The benefits provided by National Insurance contributions also include various social security benefits depending on the contributions made. These benefits include the unemployment benefits, state pension, incapacity benefit, and bereavement payments.

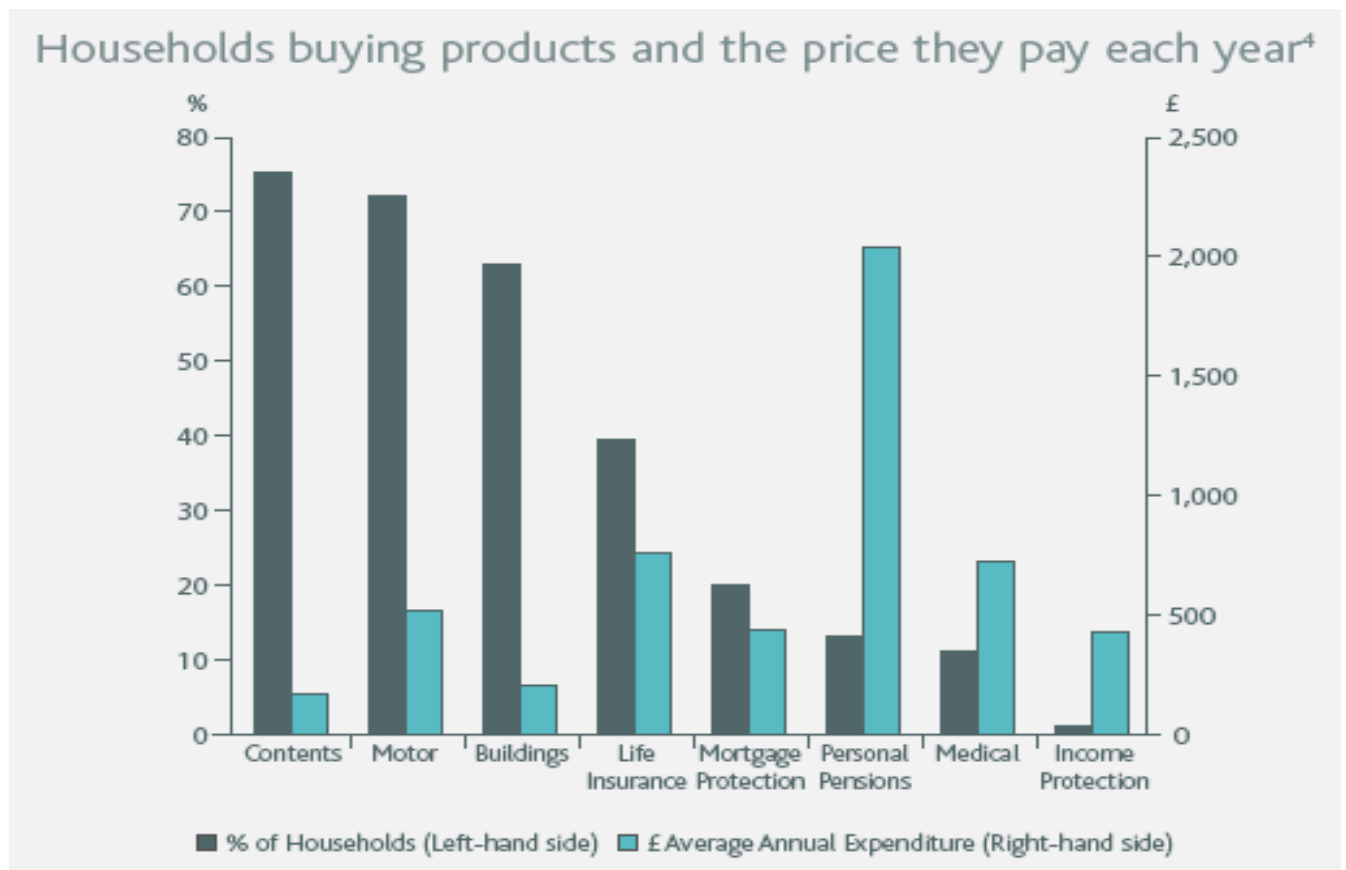
Apart from basic provisions of the N.H.S. and National Insurance, the option of protecting oneself using private insurance is also available. The significance of the private insurance industry is evident from statistics which show that the U.K. insurance industry thrives as the largest in Europe and third largest in the world, contributing 11% of total worldwide premium income in 2006 (Association of British Insurers, 2007a). The figures in Chart 10 show the percentage of U.K. households purchasing different types of personal lines insurance and the average annual expenditure in 2005/06 (with figures taken from the U.K. Expenditure and Food Survey, 2006). The chart shows that, although 75% of households purchased contents insurance, less than 40% had any life insurance cover (Association of British Insurers, 2007a). The percentage of households buying medical expenses and income protection insurance was considerably lower at around 12% and 2% respectively.

In August 2007, the Association of British Insurers (2008) conducted a detailed survey of 2000 households to investigate their protection coverage according to household type (single income families, single parent families, larger families, and single women) and explore their coping strategies. The figures for the respondents' holdings of protection insurance are provided in Table 5 – these are broadly in line with the overall averages illustrated in Chart 10, except that holdings for single men and women are substantially lower. After more

detailed interviews to explore the respondents' attitudes to protection, the Association noted that participants tended to:

- Misunderstand what insurance covers, and the types of insurance contracts.
- Lack confidence in seeking information on insurance
- Over-state the benefits provided by their employer's sickness schemes
- Underestimate the impact of long-term illness
- Did not consider covering the second adult in two-parent households

Chart 10: U.K. Household Purchase of Insurance, 2005/06



Source: Association of British Insurers (2007a, p5)

Even allowing for the state health and welfare provision in the U.K., the proportion of households buying protection insurance is low in comparison with the risks to health and income¹⁶ identified in Section 2.1. Indeed the Association of British Insurers survey of August 2007 reported that “people have no strategy in place to provide for themselves and their family should something happen that causes the primary income earner to lose their regular income. Those who do have a strategy in place often have unrealistic expectations of how they will be able to manage.” (p1)

Table 5: Proportion of Households Surveyed with Mortgages and Insurance

Segment	Holdings Mortgage	Life Insurance	Life Insurance and Mortgage	Life Insurance and no Mortgage	PPI and Mortgage	PPI and no Mortgage	Income Protection and Mortgage	Income Protection and no Mortgage
National average	34%	31%	16%	14%	9%	6%	6%	3%
Single parents	29%	24%	14%	10%	2%	4%	4%	2%
Single women	22%	13%	4%	9%	4%	4%	9%	0%
Larger families	49%	44%	33%	11%	12%	12%	14%	3%
Single earner families	90%	58%	53%	5%	26%	11%	16%	0%
Single men	18%	27%	10%	17%	7%	6%	7%	3%
Dual income families	61%	42%	32%	9%	17%	6%	12%	5%
Couples without children	30%	34%	15%	19%	7%	7%	4%	3%

Source: Association of British Insurers (2008, p26)

Besides insurance protection, precautionary saving also plays an important role in the economy. The evidence is provided in the results of several studies conducted across different countries, although this is complicated by variations in welfare system and

¹⁶ For further research on the purchase of insurance by low-income households see Association of British Insurers (2007 b and c)

macroeconomic policy. Skinner (1988) measured the savings rate using expenditure and income data provided in the American Consumer Expenditure Survey (1972-73), and concluded that 56% of an individual's lifetime wealth was the result of precautionary saving. Another American-based research by Carroll and Samwick (1998) used data from a longitudinal study called the Panel Study of Income Dynamics and estimated that 50 percent of financial wealth, and 45% of total net worth was due to precautionary motives. Meanwhile, Dardanoni (1991) used data from the U.K. Family Expenditure Survey and concluded that 60% percent of savings were the result of precautionary motives. From this estimation, it can be implied that £3801 billion out of £6336 billion total household wealth in the U.K. are a result of precautionary savings.

3.2 The Protection Gap

It is readily apparent from Table 5 and Chart 10 that individuals in the U.K. appear under-protected against wellbeing risks. The proportion of households holding some form of insurance protection is low in comparison with the risks to which they are exposed and the coping strategies (or lack of them) which have available. Furthermore, research by Swiss Re Life & Health (2007) and the Association of British Insurers (2008) show that the level of cover on existing policies is also likely to be inadequate. This shortfall leads to the existence of a protection gap, defined as “when households do not have sufficient insurance or other coping strategies in place to match the loss of income resulting from unemployment, illness or loss of life”¹⁷.

Auerbach and Kotlikoff (1991) examined the life insurance adequacy of middle-aged American households using households' financial data. Results of the study found that American wives would suffer a 30 percent reduction in sustainable income in the event of their husbands' deaths, assuming actuarially fair annuities were available. For households that were dependent on the husband's income, it was found that the surviving wives' sustainable consumption dropped by 41 percent. The problem was even more severe amongst lower-income households – almost fifty percent of wives in these households were inadequately insured, regardless of the availability of fair annuities. These findings suggest that a

¹⁷ Association of British Insurers (2008, p8)

Protection Gap exists in the U.S., and also imply that increases in social security benefits could help alleviate the poverty among widows.

Swiss Re estimates the difference between the amount of cover that individuals should ideally have and the amount of liquid assets plus life insurance held by people in U.K., and concluded that there is an appreciable protection gap¹⁸. For year 2006, Swiss Re estimated the gap persisting at £2.3 trillion sums assured for the third consecutive year (Swiss Re Life & Health, 2007). It appears that £4.2 trillion worth of cover is needed to cover the expenses of all U.K. families (including mortgage payments and basic family expenses), but only £1.8 trillion protection cover is in place. Swiss Re also estimates the shortfall in protection by permanent health or income protection insurance, terming this as the Income Protection Gap which stands at £175 billion of annual benefit.

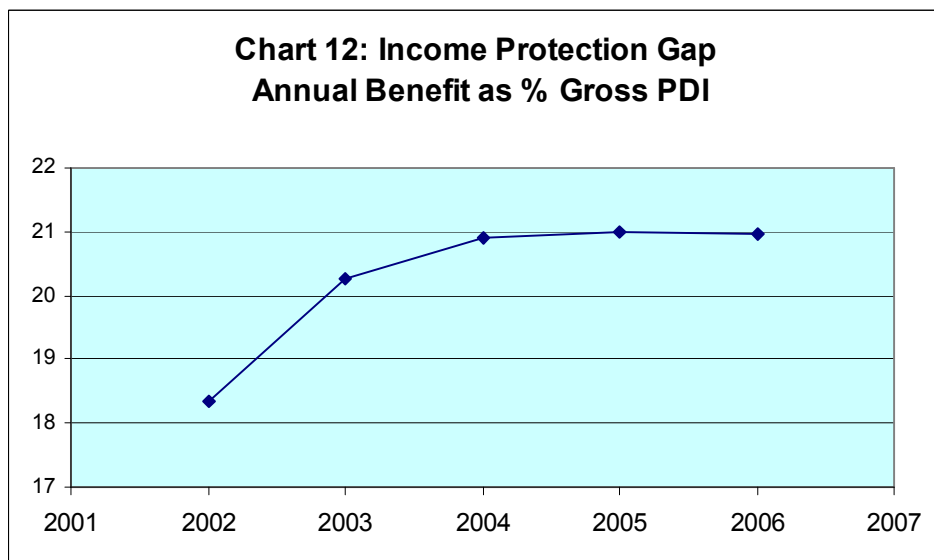
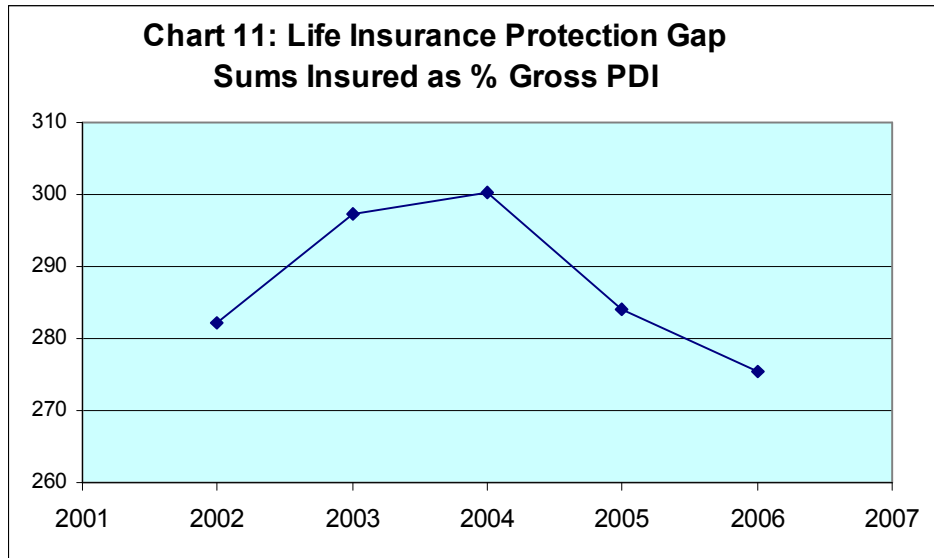
Charts 11 and 12 illustrate these estimates expressing the life insurance and income protection gaps as a percentage of total U.K. gross personal disposable income (at current prices). Chart 11 shows that the life insurance protection gap appears to have peaked in 2004 relative to P.D.I. but is still almost three times the total disposable income for the whole economy. The income protection gap in Chart 12 is smaller at around 20% of total P.D.I. but has continued to rise since 2002, although at a slower rate.

Consumer research undertaken by Swiss Re suggests that about 50 percent of the adult population has inadequate life cover. Although the Life Protection Gap spans across all income brackets of the population, the widest gaps were for the low to middle income earners and those aged below 35 and with children.

In a further report Swiss Re (2005) notes that the U.K. life insurance industry is affected by a number of factors. These include population trends, health issues, wealth distribution, ownership of goods and property, adoption of technology, gender issues, domestic business climate and household composition. While these issues may help to explain the changes in

¹⁸ The discussion in Section 5.2.1 below suggests that individuals may hold appreciable precautionary wealth in illiquid (but marketable) assets such as housing.

customer trends and attitudes, they do not reflect the failures and anomalies that exist within the industry. A discussion of these issues follows.



Source: Swiss Re Life & Health (2007)

3.3 How strong is the demand for protection in comparison with the price?

There are several factors that could account for the underinvestment in insurance protection, and the most obvious is a lack of demand at current prices, particularly in view of the budget constraints that people face when other financial obligations are of priority (Association of British Insurers, 2008)¹⁹. Furthermore, classical utility analysis suggests that it is the very lack of spending power that makes individuals less risk averse (Diacon, 2006)²⁰. The main factors driving the demand for insurance and precautionary saving are risk aversion and prudence, and these are discussed in detail in section 4.

Clearly the strength of demand for protection and precautionary saving will depend primarily on the sensitivity of consumers to insurance prices. However it is unclear how much incentive consumers actually have to search for the prices of insurance cover against the risk of rare events, especially when they have little knowledge of the probability of such events. The cost of obtaining information on the probability of such occurrences, and also on insurance premiums, may also dishearten people from the efforts of protecting themselves. On the other hand, even if individuals are able to refer to friends and family for information on purchasing insurance, such convenient and inexpensive decision rules may not produce best results.

In effect, the search costs that people need to incur in order to discover details about the risk and the insurance prices simply serve to add to the price of the cover (Kunreuther and Pauly, 2006). In section 2.2 we noted that there is little accessible and understandable public information about the chance of suffering death, injury and ill-health from all causes - and the same is true about information on protection prices. For example, the Financial Services Authority provides a free-to-use buyers' guide (www.moneymadeclear.fsa.gov.uk) which gives helpful information on various saving and protection products – but there is no price comparison data on protection products (in contrast to pensions annuities, mortgages, and savings endowments) nor any information on the incidence of sickness and injury.

¹⁹ However, this unaffordability issue lies on both sides of the coin. If people cannot afford to purchase insurance due to limited income, then they then cannot afford to finance the much higher losses in the event of a life disaster.

²⁰ Ironically, the same analysis also implies that wealthy individuals (that is ones who want to consume luxuries as their income increases) may also be less risk averse – as they are prepared to take more risk to achieve a luxury lifestyle. Of course, the author is theorizing and not speaking from personal experience.

3.4 Market failure issues

Adverse selection and moral hazard

Part of the protection gap can perhaps be explained by two well-known aspects of market failure in the insurance industry arising from an asymmetry of information between the insurer and the insured - adverse selection and moral hazard. Severe problems with information asymmetry can lead to market failure, when there is insufficient supply to meet demand (this may be the case, for example, in the market for long-term care insurance). Less severe problems with information can simply lead to higher prices – particularly for lower risk insureds – which then choke-off demand.

Both types of information asymmetry involve a positive association between the degree of risk and the amount of insurance purchased. In the case of adverse selection, customers who know themselves to be high-risk will purchase more insurance cover (if insurers are unable to observe their risk status). In the case of moral hazard, the purchase of insurance weakens the customer's incentive to control risk. To guard against the problems of adverse selection and moral hazard, insurers will usually limit the scope of the cover provided (for example, by imposing a 'waiting period' or limiting the proportion of income replaced in Permanent Health Insurance policies) and this, of course, makes the cover less attractive – particularly for low risk customers.

Adverse selection occurs when there is asymmetric information between the purchasers and providers of insurance. For instance, high-risk individuals who have better knowledge about their health situation than the insurer will take advantage of this private information by purchasing insurance, knowing that they have a higher probability of claiming. In this situation, claims will increase to a higher-than-average level, which in turn puts pressure on the insurer to increase premiums. However, increased premiums will not be attractive to consumers with low or average risk. Thus, these high premium rates will put off potential low-risk policyholders, who may turn to precautionary saving instead. However little is known of the risk-status of individuals who undertake precautionary saving.

The presence of adverse selection has been tested recently using a unique data set of annuities sold over a 17-year period by a large insurance company in the U.K. (Finkelstein and Poterba, 2004). Various aspects of the insurance contract were examined, and evidence of asymmetric information was observed – annuitants who live longer tended to select annuities with back-loaded income streams, while those who were shorter-lived selected annuities that pay beneficiaries in the event of death. It was also found that back-loaded annuities were priced higher and annuities that pay to the estate were priced lower, compared to other annuities. These results confirmed the presence of adverse selection in the U.K. annuity market.

The other aspect of asymmetric information in insurance is moral hazard. This refers to the case where the insured, aware that the insurer will pay for losses, behaves in such a way that will either increase the chance of a loss occurring (*ex ante moral hazard*) or the size of the claim once the loss has occurred (*ex post moral hazard*). As a result of this increased risk, insurers are pressured to keep premiums sufficiently high to cover potential losses. Increases in premium will again deter customers from purchasing. Thus, individuals who resort to precautionary saving instead of insurance should exhibit lower risk levels because they have an increased incentive to take care – but again little is known about this relationship.

Financial inclusion and low-income households

Some sections of the community are more likely to have insurance cover than others. In terms of property insurance, over 50% of the poorest fifth of the U.K. population do not have any home contents insurance, while the figure for the richest fifth was less than 10%. Furthermore those least likely to purchase insurance were those in low-cost social housing, rented accommodation, and the young.

Similar issues arise in the use of financial services products. It is estimated that, in the U.K., around 7% of households use no financial services products and a further 20% use only one or two products. These households are concentrated in areas of high deprivation. This ‘financial exclusion’ is of concern because the options for operating a household budget without mainstream financial services are more expensive and are often unregulated. Exclusion also inhibits people from undertaking small businesses (‘micro-entrepreneurs’).

The big question is whether these people choose not to buy insurance, or are excluded from doing so (in which case the issue of *social exclusion* arises). The Financial Services Authority has undertaken surveys of low-income households to discover why they failed to purchase home contents insurance (Kempson et al, 2000). The purpose was to determine why there is a protection gap, and to make recommendations to improve the situation. The research showed that around one-half of those households without contents insurance felt themselves to be excluded from the insurance market, while the other half deliberately chose not to buy. Of those who were excluded from purchasing contents insurance, the vast majority would like to have purchased but could not afford it (thus, they were ‘price excluded’). Presumably this was mainly because the price of contents insurance was perceived to be too high. There are a number of possible reasons for this:

1. Low-income households often live high-risk lives - there is often a positive correlation between low-income and high risk behaviour (such as smoking and poor diet). This higher risk may therefore be reflected in higher premiums if insurers decide not to cross-subsidise their high-risk customers.
2. Low income households do not have much income to insure, so the *actuarially-fair* premium²¹ should be quite low. But the administrative fixed costs in servicing the contract (selling costs, set-up costs, claims administration) could then be high in relation to the actuarially-fair premium. Policies with high minimum premiums or sums insured could be too expensive for the needs of low-income households.
3. It’s not the premiums that are too high, but the search costs and mental effort involved in purchasing insurance may be too great. The problem seems particularly acute for people with poor basic skills. Research undertaken in the U.K. in April 2001 by the Basic Skills Agency investigated the link between poor basic skills and financial exclusion. The study asked respondents to perform ten tasks to test their literacy and numeracy – the

²¹ That is, that necessary to cover the expected claims costs on average.

type of tasks they would need to do when making financial transactions. These tasks were no more difficult than would currently be expected of an average 11-year old²².

% who own:		<i>No. of Tasks Correct</i>		
		0-6	0-8	10
Life insurance	57	45	40	63
Current Account	89	62	70	93
Savings Account	57	34	35	60
National Savings	6	7	4	7
ISA	21	12	7	24
Mortgage/ Housing Loan	36	9	14	42

Source: Basic Skills Agency

These figures show that those with poor basic skills are less likely to own financial products. They are less likely to have their money in secure accounts, and less inclined to make provision for the future. The figures also show that those who have poor basic skills are more likely to be socially disadvantaged.

If such price-excluded people are to purchase insurance, then either the administrative cost base of the insurers will have to be reduced, or the premiums will need to be subsidised.

Elaine Kempson's research suggests that there may be another group of potential customers who are 'access excluded' – that is, they are willing and able to purchase cover, but the insurers are unwilling to supply it in an appropriate way. A common example of this issue is the non-availability of insurance in inner-city areas or post-codes, or for certain jobs or professions. Perhaps a more pernicious situation may arise with the growth of telephone-based and internet selling, which makes it impossible if people do not have internet access, or a bank account or a credit card.

²² For example, "What is the total cost of an airmail letter costing fifty seven pence, and a second-class stamp costing twenty four pence?" or "Which is a better deal, ten pounds off or a ten per cent reduction on a £300 TV?"

Appreciable efforts have been made to understand the protection needs of low income households (Association of British Insurers, 2007 b and c) and to improve citizens' financial capability (for example, see the programmes offered to school children and adults by the *ifs School of Finance*²³). However there has been comparatively little empirical research to explore the impact of these market failures and anomalies in personal protection markets (perhaps because of the difficulties involved – see Chiaporri & Salanie, 2000) and there is much work still to do. Understanding these issues will ultimately help in creating a more favourable protection market that will be for the benefit of both consumers and providers.

²³ For further details see www.ifslearning.ac.uk/financial_capability/index.cfm

4. CONSUMER BEHAVIOUR ISSUES

The primary purpose of this paper is to uncover the behavioural issues underlying protection choices. Section 2.2 outlined three important factors which motivate the desire for protection against wellbeing risk: vitality (the willingness to pay for improvements for life and health), risk aversion, and prudence. Comparatively little is known about the size and distribution of these behavioural drivers in a U.K. context: this section attempts to set out what is known in a straightforward way and to identify the gaps in our knowledge. This will be followed by a description of the various facets of behavioural finance and economics (and loss aversion in particular), and their relevance to protection behaviour.

It is important to note that the definitions adopted here are much more precise than those used in common parlance to describe attitudes to risk²⁴. The precision is important for a number of reasons. Firstly, the dislike of risk has many different behavioural facets (such as willingness to pay to avoid suffering, risk aversion, prudence, and loss aversion and heuristics – as discussed below) each with their own implications for consumer choice. A failure to distinguish between them (for example, in an evaluation of a consumer's or investor's willingness to take risk) may lead to incorrect advice on insurance, saving and investment products. Secondly, any ambiguity in the definition of risk attitude will almost certainly mean that it is understood differently by specialist (trained) financial professionals and ordinary (untrained) members of the public²⁵ - which can lead to possible miss-selling problems. Thirdly, a more precise definition naturally enables more precise measurement.

4.1 Vitality – the willingness to pay for lower risk of injury, ill-health or death

As noted earlier, all human beings should have a strong incentive to reduce the risk of injury, ill-health or death because these life-changing events cause pain and suffering, and degrade the quality of life. There doesn't appear to be a recognised term for this incentive – so we choose to describe it as an individual's *vitality* and claim that the degree of an individual's vitality is capable of measurement. The incentive to reduce such risks arises in addition to

²⁴ For example, research undertaken by the Financial Services Authority categorized consumers into just three groups: “risk averse, risk tolerant, and enjoy risk” (FSA, 2004).

²⁵ For example, research by Diacon (2004) showed that lay investors were much more likely than financial advisers to focus on the potential for loss in forming their risk perceptions.

the need to protect from any associated financial consequences. However, it is readily apparent that a person's vitality is not a uniform human characteristic – as is evidenced by the millions who persistently undertake actions (such as smoking, drug-taking and gluttony) which have the opposite effect²⁶.

Very little is known about the value that individuals place on their own lives (for example, to extend their life expectancy, improve the quality of life, or reduce the risk of illness, injury or unemployment) or on those factors that cause this value to differ among individuals. However, utility theory (see Appendix) suggests that an individual's vitality (the willingness to pay for reductions in health or accident risk) is motivated by behavioural traits which are different from those which drive the reduction of income volatility or precautionary saving²⁷.

In order to make a proper assessment of the extent to which individuals are prepared to pay to reduce the risk of injury, ill-health, death or worse therefore equates to the willingness to pay to avoid the loss of quality-adjusted life expectancy – the total of quality-adjusted life years (QALY)²⁸. This is closely related to the concepts of the 'value of statistical life' (VOSL) – except that this concept is usually applied to national average (statistical) lives rather than real ones. The VOSL can be thought of as the maximum amount of money the State would pay to save one statistical life, whereas the quality-adjusted life year takes into account both the quantity and the quality of life.

The U.K. Department of Transport apparently uses a VOSL figure of £1.25m in its decisions on investment in road safety. For a typical 35-year-old with a life expectancy of 40 years, a VOSL of £1.25m translates into a value of £31,250 per remaining year of life assuming the individual's quality of life has not been degraded. The figures mean that the typical 35-year old man facing a 15/10,000 mortality risk in Table 1 might be prepared to pay

²⁶ Of course, it could be argued that such behaviour arises out of ignorance or foolishness – but it is probably too widespread (and the risks too well known) for this to be a convincing explanation.

²⁷ Standard state-dependent utility analysis (for example, see Jones-Lee, 1976) implies that an individual's motivation to pay for improvements in their mortality rate is related to the fraction u/u' where u denotes utility and u' is its first derivative with respect to income (marginal utility): in other words, vitality can be measured by u'/u . However little is known about this entity and there are no known attempts to measure it.

²⁸ An average individual's total lifetime is the arithmetic product of life expectancy and a measure of the quality of each remaining life years (QALY).

£625 to reduce that risk by one-third irrespective of any other financial benefits (for further details see Baker et al, 2003)²⁹.

Experimental studies which try to estimate how much an individual might be prepared to pay to reduce the risk of death, illness or injury are fraught with theoretical and practical difficulties. However examples can be found in the health economics literature. For example, work undertaken on the willingness to pay for improved health in Denmark in 2001 suggested that, on average, people were prepared to pay around DKK88,000 for one extra QALY: this translates into around £8150 in today's prices (Gyrd-Hansen, 2003).

4.2 Risk aversion

The various ways of protecting against financial risks are largely determined by the attitudes that people have towards risk. This is because although risk may be objective and measurable, attitudes toward risk are very much more subjective. An important component is the concept of *risk aversion*, which is used to measure the intensity of the desire to purchase certainty by an individual exposed to income volatility (see Box 2). Individuals who are risk averse dislike risk and will require compensation for the risks they take. The amount of compensation required to accept risk, or the maximum amount an individual is willing to pay to remove risk, is referred to as the *risk premium*. Assuming all other factors are equal, people who are more risk averse will require a higher risk premium to induce them to accept risk. By examining the risk premium that individuals are willing to pay to remove risk, the intensity of the desire to purchase insurance can be investigated.

Revolutionary attempts to measure risk aversion can be attributed to Pratt (1964) and Arrow (1965) who formalized the constructs of absolute risk aversion using a concave von Neumann-Morgenstern utility function defined over income. The aversion to risk can then be measured by the (negative of the) second derivative of a utility function with respect to income divided by its first derivative³⁰. The resulting measure of absolute risk aversion can be shown to be approximately equal to the individual's risk premium (that is,

²⁹ Note that an individual whose behaviour exhibits *loss aversion* (see section 4.3 below) will usually pay a larger amount to avoid losing one QALY than to gain one QALY.

³⁰ That is $-u''/u'$ where $u(y)$ is the utility associated with income y . Further details of expected utility theory are provided in a short Appendix.

the maximum amount the individual would pay to remove the risk) divided by half the variance of the risk³¹.

Box 2: What does risk aversion imply?

If we know the size of an individual's risk aversion, it is then possible to assess the maximum he or she is prepared to spend on insurance against the risk of fluctuating income. Suppose a fully-informed and rational person with relative risk aversion r has annual net income which is either £30,000 or £20,000 with equal probability (ie £25,000 on average).

Using the Arrow/Pratt approximation*, it is straightforward to show that this individual would be content to have income £ (25,000 – 500 r) *for certain* as an alternative to the risky option. Using a typical value of $r = 4$, produces a “certainty equivalent” income of £23,000: put another way, this individual is prepared to sacrifice 8% of her average income in order to get certainty.

* See Eeckhoudt, Gollier & Schlesinger (2005) ch 2

Since the introduction of these measures, other researchers have explored the determinants, as well as magnitudes and directions of risk aversion. However, the methodologies and data employed by researchers have been mixed, resulting in varied conclusions on the significance of this unobservable yet influential human attribute.

The empirical economics literature reveals several different methods of assessing risk aversion (or its reciprocal - risk tolerance). Some researchers examine individuals' actual behaviour (e.g. by looking at their investment portfolios or smoking and drinking habits) to infer their risk aversion levels. Others use surveys or questionnaires which either probe into investment choices, or ask subjective hypothetical questions on the trade-off between risk and certainty, or a combination of the two types of questions. Research in the United States by Barsky et al. (1997), which has been widely cited and used by other researchers, was administered as part of the first wave of the U.S. Health and Retirement Survey in 1992 and generated over 11,700 responses (which were obtained via face-to-face interviews). The

³¹ The so-called *relative risk aversion* is the absolute risk aversion measure multiplied by the individual's income, which equals the risk premium divided by $(0.5\sigma^2)$ as a proportion of income).

questionnaire instrument involves subjective hypothetical questioning pertaining to gambles over lifetime income, worded as follows:

Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance it will double your (family) income and 50-50 chance that it will cut your (family) income by a third. Would you take the job?

If the respondent answered ‘yes’ to the first question, the following question was asked:

Suppose the chances were 50-50 that it would double your (family) income, and 50-50 that it would cut it in half. Would you still take the new job?

If the respondent answered ‘no’ to the first question, then the following question ensued:

Suppose the chances were 50-50 that it would double your (family) income and 50-50 that it would cut it by 20 percent. Would you then take the new job?

From the answers provided to these two-sequence questions, respondents were sorted into four separate risk preference groups, as described in Table 6. Mean estimates of relative risk aversion were obtained, which ranged from 0.7 to 15.8, with an overall weighted average of around 12.0. Around two-thirds of the adult U.S. population appears to fall into the highest category of risk aversion, but the distribution is skewed with a substantial minority displaying much lower levels of dislike for risk.

Table 6: The Distribution of Relative Risk Aversion in the U.S., 1992

Group (ordered by risk aversion)	Percentage in Group	Mean Relative Risk Aversion (in Group)
1. Highest	64.6	15.7
2.	11.6	7.2
3.	10.9	5.7
4. Lowest	12.8	3.8

Source: Barsky et al. (1997)

Since an individual’s risk aversion is an unobservable construct, it is important to determine whether aversion is randomly distributed across the population or is correlated with identifiable individual characteristics. In the Barsky study, significant differences were observed across demographic attributes of the respondents. Differences in aversion to income risk (and hence in the intensity of demand for insurance) amongst different age

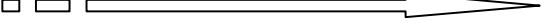
groups were noted - the youngest and oldest groups of respondents within the sample were found to be less risk averse compared to middle age-groups. Men and women also displayed differences in risk aversion levels – men were found to be less risk averse than women. Amongst five different ethnic groups (white, black, Asian, Hispanic and others), whites were found to be the most risk averse while Asians revealed to be the least risk averse. Across various religions (Protestant, Catholic, Jewish and others), noticeable differences in the degree of risk aversion were also observed. Jewish respondents were found to be the least risk averse, while Protestants appeared to be the most risk averse.

The measures of risk aversion in the Barsky study have generally proved to be a good predictor of personal risk management behaviour. For example, respondents who smoke or drink were less risk averse compared to those who did not engage in the same behaviours. Meanwhile, respondents who reported owning health or life insurance had higher measures of risk aversion, compared to those not owing these policies. In terms of income and wealth, people in the lowest and highest income and wealth quantiles appeared to be less risk averse compared to those in the middle range. The findings of Barsky et al. (1997) can be summarized in the typology of risk aversion levels as outlined in Table 7 (see also Tables 8 and 9).

While the efforts of Barsky et al. (1997) have proved to be a significant milestone in the investigation of risk aversion, the usage of probabilities and numbers in the questions has been criticized as being too complicated for most people to understand, and furthermore, ambiguity regarding the treatment of income tax fails to provide a true representation of risk aversion. Thus, attempts have been made to improve on these hypothetical job choices, including the use of pension choices rather than jobs and graphical illustrations to increase respondents' understanding of hypothetical alternatives (e.g. Hanna and Lindamood, 2004). Other researchers (e.g. Kapteyn and Teppa, 2002) combine both subjective and objective measures such as observed portfolio choices of households to estimate risk aversion. Similarly, Schooley & Worden (1996) use the relative risk aversion (RRA) calculated from household's portfolio allocation (using the riskiness of portfolios measured as the proportion of risky assets to wealth) as well the RRA reported by household in terms of willingness to take financial risk, to compare the interchangeability of the two measures. Data for both

these measures are taken from the 1989 U.S. Survey of Consumer Finances. The results of a one-way variance analysis show that both measures generally measure the same construct, also indicating that households typically understand their relative level of risk taking.

Table 7: Risk aversion level across demographic and behavioural groups, U.S., 1992

ATTRIBUTES	Comparative Level of Risk Aversion				
	LOW (more risk tolerant)				HIGH (dislikes risks)
Age group	Young (3.93)	Old (4.11)			Middle (4.22-4.34)
Sex	Male (4.08)				Female (4.20)
Race	Asian (3.62)	Hispanics (3.75)	Other (4.06)	Black (4.16)	White (4.21)
Religion	Jewish (3.73)	Catholic (3.98)	Other (4.00)		Protestants (4.26)
Behaviour	Currently Smokes (4.04) Drinks (4.07) No life insurance (3.92)		Quit smoking (4.12)		Never smoked (4.25) Doesn't drink (4.27) Owns life insurance (4.24)
Income	Lowest (3.91)	Highest (3.98)			Medium (4.23-4.33)
Wealth	Lowest (3.84)	Highest (4.11)			Medium (4.20-4.31)

Source: Barsky et al. (1997)

According to psychologists, various factors account for the differences in risk attitudes. These include the influence of genetic or biological-development tendencies across genders and races, as well as religious or philosophical beliefs, socialization and learning from life experiences such as education, marriage and work. Researchers have also explored differences in risk aversion across demographic groups. A number of studies compared the risk attitudes between men and women and found that women showed higher risk aversion levels than men, confirming the results of Barsky et al. (1997). These studies include those by Levin, Snyder, and Chapman (1988) which asked 110 college students hypothetical questions

regarding gambles, and a study by Powell and Ansic (1997) which asked small samples of college students experimental questions regarding property insurance and foreign currency. Similar results were also obtained by Jianakoplos and Bernasek (1998) who used survey data on the proportion of wealth invested in risky assets and found single women to be more risk averse than single men. Kapteyn and Teppa (2002) investigated individual variation in risk aversion measures and explain them according to background characteristics. Using data from the Dutch CentER Saving Survey (CSS) which employed a similar subjective hypothetical questioning as Barsky et al. (1997), they found that males were less risk averse than females. Also, people with higher education were less risk averse than those with lower education background.

Other researchers examine differences in risk attitudes across other types of demographic variables. Wang and Hanna (1997) examined the effect of age on risk aversion by analysing the wealth composition of households and found that risk aversion decreases with age. By exploring asset allocation decisions, Riley and Chow (1992) found risk aversion to decline with education, wealth, and age (until age 65, at which time risk aversion increases). In this study risk aversion was also higher among females and nonwhites than among males and whites, respectively. Meanwhile, Zuckerman (1994) who used a psychological questionnaire, found differences in risk aversion by age, gender, nationality, race, socioeconomic status, birth order, and marital status.

The measurement of risk aversion has caught the interest of researchers for a variety of reasons. For researchers associated with the financial services industry, measures of risk aversion are imperative in understanding the preferences of customers in relation to income volatility. This helps to ensure the recommendation of appropriate portfolio compositions and the development of desirable financial products to meet the needs of specific target markets.

4.3 Prudence

Another important concept in relation to behaviour under uncertainty is *prudence*, which refers to the propensity to prepare and forearm oneself in the face of the volatility of future income. A prudent individual will take precautions in the face of risk, whereas a risk averse

person dislikes risk and requires compensation to accept it. An intuitive interpretation by Kimball (1990) is that prudence measures the intensity of the precautionary saving motive, just as risk aversion measures the intensity of the desire to purchase insurance (See Box 3).

Box 3: What does prudence imply?

The impact of prudence on precautionary saving can be illustrated in similar way to risk aversion, although with a few more assumptions. As before, suppose a fully-informed and rational person has annual net income this year of £25,000. However next year, her income is expected to fluctuate between either £30,000 or £20,000 with equal probability (ie £25,000 on average). The measure of prudence can be harnessed to indicate how much precautionary saving she is likely to undertake. Obviously, precautionary saving reduces consumption in the first year so that consumption in the second can be higher.

Suppose that we can ignore the impact of interest rates (ie that the rate of interest equals the rate of inflation). We also need to assume that the individual is as happy to consume income in the second year as she is in the first (that is, she is not *impatient* for early consumption). Under these circumstances, there would be no saving at all if the second-period income were fixed at the average level of £25,000.

Under these conditions it can be shown* that, once the second period's income becomes risky, she would save £ 250 p in the first year where p was her measure of relative prudence. Using a typical value of $p = 5$, produces precautionary saving of £1250, that is 5% of the first year's income. Put another way, this individual is prepared to save £1250 in the first year in order to ensure that second year spending can be partly cushioned against risk.

* See Eeckhoudt, Gollier & Schlesinger (2005) ch 6

Estimates of prudence were first initiated by Leland (1968) and further developed by Kimball (1990). Miles Kimball demonstrated that prudence measures the *sensitivity* of choices to risk and describes prudence as being “isomorphic to the Arrow-Pratt theory of risk aversion”. He showed that while the sign of the second derivative of the utility function determined the presence or absence of risk aversion, the sign of the third derivative indicates the presence or absence of a precautionary saving motive. Prudent behaviour has also been assumed by examining changes in precautionary wealth - households will conserve more wealth (i.e. have more precautionary saving) when they are faced with greater uncertainty. Positive changes in wealth accumulation due to the presence of risk thus imply prudent behaviour.

Unlike the volume of research devoted to risk aversion, prudence has received less attention by empirical researchers. A number of studies have found little or no evidence of prudent behaviour amongst households. For example, Dynan (1993) estimated the coefficient of relative prudence to gauge the strength of precautionary saving by using consumption data from the 1985 Consumer Expenditure Survey in the U.S.. Using consumption variability as a measure of risk, she finds an implausibly small and statistically insignificant coefficient of relative prudence³² at 0.312. These results suggest that precautionary saving may be an unimportant component of consumer behaviour – but this is contrary to findings of most other studies (see section 5.2).

In contrast, Eisenhauer and Ventura (2003) used data from the 1995 Survey of Italian Households' Income and Wealth which asked a hypothetical trade-off question³³ to estimate the extent of precautionary saving in response to income risk³⁴. In contrast to the insignificant findings of Dynan (1993), the authors found that on average, relative prudence for the Italian sample (and hence the strength of the precautionary saving motive) was reasonably high at 7.32 (see Box 3 for an interpretation).

Eisenhauer and Ventura (2003) also noted differences in the intensity of prudence (and hence the precautionary saving motive) the across demographic and socio-economic groups. For example, a positive correlation between relative prudence and education level was found in the sample - the higher the level of education, the higher the coefficient of prudence. The relative prudence of respondents who went to college was 11.71, whereas it was around one-half that level (5.86) for those who only went to elementary school. These results suggest that college-educated people are much more likely to hold assets for precautionary reasons than their less-educated counterparts. Men appear to have a higher level of prudence than

³² These estimates of relative prudence seem implausible because an individual with constant relative risk aversion r would be expected to have constant relative prudence $p=1+r$. So an estimate of $p<1$ would imply that the typical survey respondent was risk preferring (that is, $r<0$) – which seems highly unlikely.

³³ The question is worded as follows: “You are offered the opportunity of acquiring a security permitting you, with the same probabilities, either to gain 10 million lire or to lose all the capital invested. What is the most you are prepared to pay for this security?”

³⁴ The authors conducted the estimation procedure twice to account for possible ambiguity in the question – respondents could have either interpreted the 10 million lire as either a *gross gain* (not considering the purchase price) or a *net gain* (after subtracting purchase price from the gross gain. Thus, the first model used *gross gain* and the second model used *net gain*. The values of relative prudence reported here is taken from the *net gain* model.

women. Life insurance policyholders also displayed higher levels of relative prudence than those without life cover. Individuals with higher financial wealth and income were found to have larger prudence coefficients. Table 8 summarizes these results.

Table 8: Relative risk aversion (r) and relative prudence (p), Italian households, 1995

	r	p
All	7.18	7.32
Men	7.39	7.52
Women	6.21	6.35
Elementary school	5.78	5.86
Middle school	6.14	6.23
High school	7.73	7.88
College	11.50	11.71
Married	7.59	7.73
Single	5.51	5.63
Life insurance	8.04	8.16
No life insurance	6.77	6.91
Health insurance	8.19	8.39
No health insurance	6.95	7.08
Fin wealth < 11mm	5.67	5.73
Fin wealth > 11mm	8.36	8.51
Income < 41mm	4.25	4.36
Income > 41mm	9.58	9.75

Source: Eisenhauer and Ventura (2003)

In contrast to using responses to speculative risk situations (which involve potential gain as well as potential loss), an earlier study by Eisenhauer (2000) examined prudence in situations where there is a possibility of loss but no gain. Rather than using savings data, the author used information on term life insurance on the head of the household from the 1992 U.S. Health and Retirement Survey. For the overall sample, Eisenhauer estimated coefficient of relative prudence for U.S. households of 3.28 – appreciably lower than the corresponding

figure for Italian respondents obtained by Eisenhauer and Ventura (2003)³⁵. Differences were also noted across demographic characteristics: for example, the coefficient of relative prudence for women was more than three times larger than that for men. Older individuals (those aged 56 and above) were also found to be more prudent (i.e. more inclined to save for precautionary reasons) than their younger counterparts. Married individuals displayed higher prudence than unmarried individuals, and those with children also exhibited higher coefficients compared to childless couples. In terms of behaviour, non-drinkers and non-smokers were observed to be more prudent than individuals who drink and smoke, respectively. These results are summarized in Table 9.

Table 9: Relative risk aversion and relative prudence among U.S. households, 1992

	<i>r</i>	<i>p</i>
All	3.4872	3.2814
Men	1.7367	1.5063
Women	5.2343	5.1527
Age ≥ 56	5.3291	4.8833
Age < 56	2.9346	2.8173
Married	3.4687	3.2269
Unmarried	2.8918	2.8092
Parents	4.7019	4.6195
Childless	1.9341	1.6673
Drinkers	2.9407	2.7509
Non-drinkers	4.5299	4.2850
Smokers	2.8579	2.8577
Non-smokers	3.7042	3.4391
Never smoked	4.6905	4.4498
Quit smoking	2.9062	2.4998

Source: Eisenhauer (2000)

4.4 Behavioural concepts in finance and economics

The concepts of risk aversion and prudence have been established within the context of rational human behaviour assumed in normative theories such as the expected utility theory. However, a large volume of empirical studies related to investment and saving have

³⁵ Which might imply that Italians have a stronger propensity to save for precautionary reasons than their American counterparts.

observed features of individuals' actual risk-taking behaviour that are difficult to reconcile with the theoretical predictions. These anomalies have spurred much research in behavioural economics and behavioural finance aim which provide alternative explanations³⁶.

Perhaps the most prominent theory to emerge in the area of behavioural finance and economics is the Prospect Theory developed by Daniel Kahneman and Amos Tversky (1979). The theory introduces cognitive psychological approaches in attempts to provide a fuller explanation on the observed inconsistencies between theory based on assumptions of rationality and actual human conduct. Prospect Theory describes how individuals make decisions in situations where they have to decide between risky financial alternatives. Several key behavioural concepts are suggested in the Prospect Theory: bounded rationality, loss aversion, heuristics, mental framing, regret aversion, mental accounting and self-control.

Bounded rationality

While traditional models are largely based on the assumption that agents are rational in their decision making and make decisions with full information, behavioural finance and economics applies provides psychological insights on human behaviour. The view that individuals have bounded rationality (Simon, 1955) suggests that human beings have limited information processing abilities and are not capable of solving complex economic problems. We are all easily influenced by emotions and tend to act sub-optimally, possibly infusing biases while making decisions.

Loss aversion

Loss aversion refers to the idea that people tend to frame outcomes in terms of changes from a reference point rather than the impact on their resulting state of wealth, and then weigh losses more heavily than gains of the same magnitude (see Box 4)³⁷. Loss aversion is thought to be the driver of the so-called 'endowment' effect where the owners of an asset appear to value it more highly than do potential buyers. Loss aversion also explains the unwillingness of investors to dispose of assets which are falling in value.

³⁶ For example, see Thaler (1993), Thaler (2005) and Wilkinson (2008)

³⁷ Suppose for example, that a stranger in the street gave you £50: you would probably feel elated! Then suppose another stranger stole the money before you'd had a chance to spend it. The idea of loss aversion suggests that, on balance, you would feel worse off – because the anguish caused by losing the £50 is not fully balanced by the pleasure of receiving it in the first place. You don't think "easy come, easy go"!

Box 4: What does loss aversion imply?

Loss aversion arises from two key commonly-observed behaviours (which are ruled-out of the classical expected utility theory): the framing of decisions in terms of ‘gain’ and ‘loss’ relative to some *status quo* and the fact that losses seem to cause more hurt than the pleasure obtained from the equivalent gain.

Suppose an individual has annual net income which is either £30,000 or £20,000 with equal probability (ie £25,000 on average). Assume that, in thinking about this risk, she frames the situation as either a ‘gain’ of £5000 or a ‘loss’ of £5000 around the status quo of £25,000. We also assume for simplicity that she is risk neutral (ie neither risk averse nor risk preferring) over fluctuations in these gains and losses*. Thus if she has no loss aversion behaviour, she will be indifferent between the certainty of zero and the 50/50 risk of a £5000 gain or loss.

However an individual exhibiting loss aversion, with a *loss aversion parameter* $\lambda > 1$ would suffer a net welfare gain on average of $0.5(5000)(1-\lambda)$ from this risk and would then be worse off (than the certainty of zero) even though she is risk neutral to the volatility of gains and losses.

Put another way, a 50% chance of a ‘gain’ of 5000λ would be necessary in order to compensate an individual who is loss averse for the 50% chance of a £5000 ‘loss’ - even though she is otherwise risk neutral.

* In fact, Kahneman & Tversky (1979) reported that individuals were likely to be risk averse over gains, but risk preferring over losses.

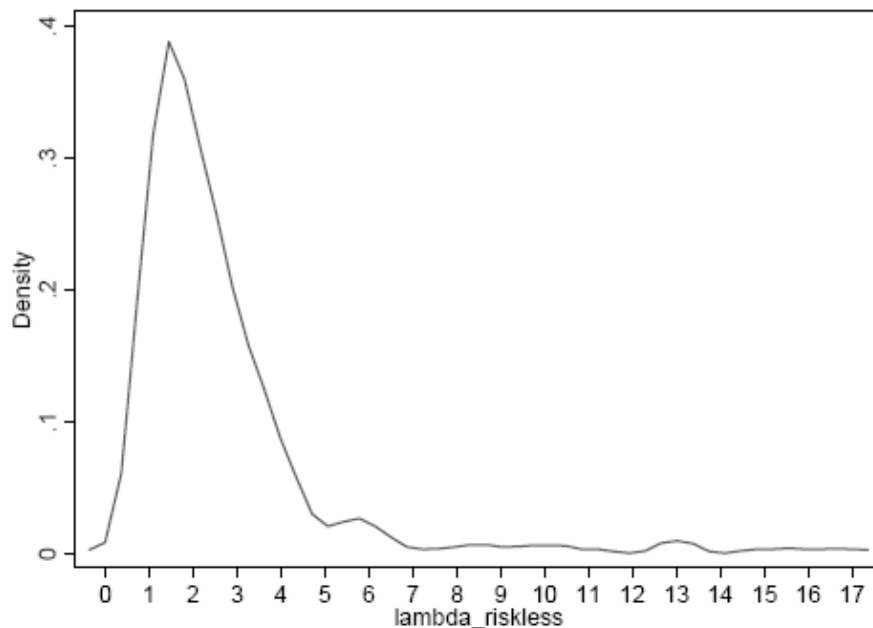
Survey-based research by Gächter, Johnson & Herrman (2007) on 660 customers of a German car manufacturer produced a highly skewed distribution of the measure of loss aversion λ (see Chart 13): 88% of individuals demonstrated a degree of loss aversion (ie $\lambda > 1$) and 10% had $\lambda > 4$. The median value of λ was 2.0.

The fact that the over-whelming majority of individuals seem to be loss averse has significant implications for insurance and financial planning decisions. It suggests, for example, that when making investment decisions, individuals may be disproportionately influenced by an asset’s capital risk (the risk that an asset may fall in value). Similarly, when considering the security of their investments, individuals may be surprisingly sensitive to the possibility of

the failure of their financial services provider (sometimes termed ‘counterparty risk’) as we saw in connection with the ‘run’ on Northern Rock bank in September 2007. Loss aversion has been used to explain otherwise anomalous protection decisions.

Kunreuther (1996) demonstrated that people usually fail to insure themselves against “low probability, high loss” risks, even when the terms and premiums are favourable. The idea is that the ‘loss’ of the premium outweighs the ‘gain’ of any insurance recovery because the premium ‘loss’ is exaggerated³⁸. The implications for insurance suggest that individuals may allocate undue weight to the ‘loss’ of the premium and the financial loss in comparison to the ‘gain’ of the claims compensation – so producing an overall under-appreciation of the benefit of insurance.

Chart 13: The Distribution of Individual Loss Aversion Parameter λ among German households, 2007



Source: Gächter, Johnson & Herrmann (2007, p11)

³⁸ The non-purchase of windstorm insurance also provided one of first illustrations of the availability heuristic.

Gächter, Johnson & Herrmann (2007) also analyse the distribution of loss aversion by socio-demographic characteristics (Chart 14) and show that loss aversion rises with age and income. They also report that loss aversion is greater in females (average = 3.78) than males (3.37) and decreases with education. This last result confirms findings by Diacon (2004) that financial advisers, who had undertaken a series of financial planning qualifications, were less likely than their customers to display loss aversion in their risk perceptions.

Chart 14: Factors Affecting the Distribution of Loss Aversion among German households



Source: Source: Gächter, Johnson & Herrmann (2007, p15)

Another study by Langer and Weber (2003) showed that changes in the duration of commitment period (i.e. the duration of being insured) influenced the decision to commit to

the “low probability, high loss” risk. When the commitment period was longer, the willingness to commit to such risky investments would decrease. This phenomenon suggests that people are more inclined towards taking risks in situations when the evaluation period is shorter. For shorter time-periods, the advantages of staying uninsured (i.e. saving on the premiums) will outweigh the disadvantages of possible uninsured losses. However, when the duration is longer, the probability of incurring losses at least once during that period increases. Thus, in line with the notion of loss aversion, people would then tend to weigh the potential ‘loss’ of the premium payment more than the ‘gain’ of loss indemnification.

Heuristics

In the behavioural literature, the term heuristics refers to decision-making processes which are based on mental shortcuts or rules of thumb (rather than using long, comprehensive and complex rationalizations for making decisions). Perhaps the best-known heuristic is the concept of *availability* – where a person’s sensitivity to risk is influenced by the ease with which they can conceptualise or recall similar incidents³⁹. Although decisions based on heuristics are therefore made quickly and easily (with comparatively little information or the application of mental effort), the individual’s limited information, experience and predictive skills may lead to mistakes.

A person’s upbringing, personal experiences, surroundings, as well as educational and occupational background may impact the heuristics that are used to make decisions. In the decision to buy protection, studies have found that prior experience greatly influences insurance decisions. For example, a study conducted in California, U.S. by Kunreuther (1996) found that before an earthquake in 1989, 34% of uninsured homeowners perceived earthquake insurance as unnecessary. However after the tragedy, only about 5% gave the same response, and one-third of the previously uninsured homeowners decided to insure their properties against the risk of earthquakes⁴⁰: this is an example of the availability heuristic in practice. Likewise, another study by Browne and Hoyt (2000) found a positive

³⁹ The ease of imagining an example or the vividness and emotional impact of that example becomes more credible than actual statistical probability.

⁴⁰ Of course, the occurrence of an earthquake is usually thought to reduce the subsequent risk - so the increased purchase of insurance was likely to be due to the heightened perception of risk rather than the actuality.

correlation between flood insurance purchases with level of flood losses in certain states of America.

Mental frames and mental accounts

Another cognitive illusion influencing the decision making process is mental frames – the illusionary states of mind which highly influence perceptions and therefore the decision making process. According to Shefrin (2002, p.23), a frame is “the form used to describe a decision problem”. The Prospect Theory posits that there are two stages in the decision making process – first, the stage of “framing and editing” where initial investigation of the decision problem is undertaken, and followed by the second phase which involves evaluating the framed prospects and choosing the prospect with the highest weighted value. Framing refers to the manner in which the choice problem is presented and incorporates the influence of norms, habits and expectancies on the decision maker (Tversky and Kahneman, 1986).

Related to the idea of mental framing is the concept of mental accounting which is the propensity of individuals to group their assets into several ‘mental accounts’ and use cognitive operations to organize, evaluate and keep track of financial activities. For example, people may categorize their assets into ‘current assets’ such as cash or current accounts which can be used on a regular basis. They may also have a ‘current wealth’ category which includes savings accounts, stocks and bonds. A ‘future income’ account includes money that will be earned in the future such as retirement accounts. Mental accounting also suggests that people will have different risk attitudes for each mental account.

Self-control

Self-control or the lack of willpower is another problem faced by individuals which may deter them from making financial decisions as prescribed by normative theory. An individual may be aware of the importance of saving and protection, but may not have the self-control to set aside income regularly. Camerer, Loewenstein and Prelec (2005) suggest that people behave this way because decisions on risk-taking, saving and investment involved deliberate, time-intensive effort - what they term ‘controlled’ processes (which are in contrast to automatic processes where the brain makes decisions almost unconsciously and effortlessly).

Making financial decisions is like preparing for and taking an examination – the brain doesn't like doing it because it's hard work!

Self-control is vital in relation to protection decisions. Engaging in precautionary saving requires internal discipline, and a lack of self-control can lead to inadequate precautionary saving. Research by Otto, Davies and Chater (2007) revealed that people are aware of their self-control problems, and use some degree of self-control methods to guide their saving transfers, including limiting access to the funds, restricting liquidity, and using mental accounting rules.

Life insurance, on the other hand, has external mechanisms in place to assist individuals to adhere to their commitments. In recognition of self-control issues, insurance programmes use automatic premium deductions and early withdrawal penalties to help individuals stick to their plans. However, the idea of early withdrawal penalties may instead backfire and deter people from initiating such plans.

This section laid out several behavioural issues that affect individuals' protection choices. The choice decision between precautionary saving and insurance, and the impact of behavioural factors on this issue, remain unclear. The following section will explore the differences between the two protection methods and provide a review of research on life insurance demand and precautionary savings.

5. INSURANCE VERSUS PRECAUTIONARY SAVING

In the previous section, a number of behavioural concepts were introduced to explain how individuals make decisions in the presence of the risk of current and future income volatility. This section will continue the discussion by examining the two key alternatives for protection – precautionary saving and insurance. First, a general comparison between the two will be given, followed by a review of the empirical literature. The final part of this section will explore whether the two protection choices act as complements or substitutes.

5.1 A Comparison between Insurance and Precautionary Saving

Do people tend to protect against risks using insurance or precautionary savings or both? An insight into this may be found from statistics on health costs provided by the World Health Organization. In 2004, 86.3% of health expenditures in the U.K. were supported by the government, while the remaining 13.7% were paid by the private sector: from these private expenditures, 91.80% constituted out-of-pocket payments, while the remaining 8.2% were paid through private prepaid plans such as private insurance. These figures clearly show that health risk expenditures paid by the private sector are largely self-financed, rather than being insurance-funded. The implication of this is serious – people either need to ensure that they have adequate precautionary saving to avoid current wealth being depleted, or must otherwise use the transfer mechanisms of market insurance to pay for these costs.

What are the factors that influence the choice between insurance and precautionary saving? A comparison between insurance and precautionary saving reveals several key distinctions. Comparing the all-inclusive feature of precautionary saving as opposed to the risk-based payment concept of insurance, we would expect to see different segments of the market having diverse preferences towards the two types of protection methods. In particular, individuals with higher values of prudence viz-a-viz risk aversion will be more inclined to use precautionary saving. The same applies to individuals with a high degree of loss aversion (since there is no ‘loss’ of premium in precautionary saving). However, as noted earlier, very little is known about the relative strengths of risk aversion, prudence or loss aversion in the United Kingdom – certainly not enough to be able to undertake a market segmentation exercise.

The main benefit of taking up an insurance policy is the immediate capital creation (i.e. the sum insured) guaranteed to be paid out in the event of a pre-specified adversity. Generally, by paying the first instalment of premium, the insured is assured of the immediate access to liquidity. This is a clear advantage over precautionary saving, where time is required to build up the required savings/capital hence exposing the individual to possible insufficiency of funds⁴¹. The saving decision also requires the individual to make a judgment on the maturity term and liquidity.

On the other hand, the advantage of self-insuring through precautionary saving is that the events which may trigger access to the funds do not need to be pre-specified in a formal contract. In contrast, insurance can only be obtained for risks which are defined in the insurance contract (for example, the types of disease or incident covered in critical illness insurance are used specified very precisely). To cover against a variety of risks, it may be necessary for an individual to purchase several different types of insurance contracts, which implies the possibility of high transaction costs in maintaining these policies. For precautionary savings, these costs are relatively low since only one type of account (e.g. a savings account) can be used for all eventualities so long it is ‘topped up’ after being drawn down. Furthermore, unused precautionary savings are still available for alternative consumption and/or saving purposes if the risk diminishes or if a greater need arises, whereas any unused insurance premiums are usually lost⁴².

The varying costs of protection also have different effects on various population segments. We know that life, health and accident insurance premium rates can be very dependent on risk factors such as gender, age and health – particularly for higher-risk individuals⁴³. In other words, the price of insurance is often risk related, since premium rates change by risk levels. This has a number of advantages, not least in providing the individual with incentives to control the risk and limiting any problems arising from adverse selection (see Section 3.4). However, the ‘price’ of precautionary savings is not dependent on personal risk factors but

⁴¹ Of course, this difference is captured in the relative size of the risk aversion and prudence parameters.

⁴² Some insurance contracts have provided a partial rebate of premiums in the event of an accident-free year, however this practice can make it difficult to compare insurance prices.

⁴³ The costs of risk classification often mean that insurers charge similar prices to individuals with a wide range of risk (for example, to lives classified as ‘standard’ in life insurance), and only discriminate for the highest risk individuals where there would be a substantial adverse selection problem otherwise.

depends instead on maturity term and liquidity. Thus because of the discrimination of price according to risk, high-risk individuals (for example, older people) may prefer to save for protection purposes rather than purchase insurance. In contrast, in markets characterised by adverse selection⁴⁴ (where low-risk customers are penalised by higher-than-necessary prices), it may be the low-risk individuals who neglect insurance in favour of precautionary saving.

5.2 Existing Research on Insurance and Precautionary Saving

5.2.1 Precautionary saving

A considerable amount of research on precautionary savings has been conducted to gauge the response of consumers to volatility in their wealth holdings resulting from uncertainties in income, out-of-pocket medical expenses and length of life. Of course, the major difficulty faced by researchers is that the amount of precautionary saving or savings cannot be separately identified. Before reviewing the literature, the measurement approaches used by these researchers will first be described.

Two key measurement approaches are typically used by researchers to estimate precautionary savings. The first estimates the coefficient of prudence which indicates the strength and magnitude of the attitude that drives precautionary behaviour (see section 4.3). A larger coefficient of prudence reflects a stronger precautionary saving motive.

The second method assesses the changes in wealth accumulation in relation to changes in risk. Studies using this method stress that households will want to conserve more wealth when they are faced with greater uncertainty - such as the potential fluctuations in future income and sudden out-of-pocket medical expenses. The following reduced-form equation is used in the estimation of precautionary saving to establish the magnitude and direction between wealth and the associated risk:

$$W_i / Y_i^p = f(\sigma_p, X_i)$$

⁴⁴ For example, as in the private annuity market (Finkelstein & Poterba, 2004)

where W_i is wealth held by household i , Y_i^p is the permanent non-property disposable income, σ_i is a measure of risk, and X_i is the variable vector representing household characteristics that affect utility. The equation tests the hypothesis that wealth accumulation will be greater when risk is higher. Although the above model is common research practice, different researchers use different measures of risk and wealth.

The various proxies for the risk variable σ_i that have been used by researchers are variance in income and consumption, subjective measures of income risk (such as probability of job loss), and the probability of out-of-pocket medical expenses⁴⁵. In addition to the difficulties of proxying for risks, there are different ways of measuring household wealth. Total household net worth is composed of many asset and liability components, and selecting the most appropriate measure requires clear justification. Wealth components have different liquidity and accessibility levels, and may be used in different ways. Some researchers use a measure of “very liquid wealth” (such as savings account, current account and certificate of deposits) to estimate precautionary wealth accumulation⁴⁶. However, restricting wealth to just liquid forms may lead to flawed estimates as people normally hold a range of assets in their portfolio. Quite commonly, households prefer not to hold significant amounts of their assets in liquid forms but rather in illiquid but marketable assets such as home equity⁴⁷. Thus restricting wealth to only liquid assets is likely to result in an error in the estimation of precautionary wealth (and hence of any protection gap). Because of this, some researchers (for example, Starr-McCluer, 1996; Lusardi, 1998, 2000; Carroll and Samwick, 1997) use various wealth categories such as financial assets (very liquid assets plus stocks, bonds, mutual funds, pension funds) and net worth (total value of assets minus liabilities) to capture a broader definition of wealth.

Unfortunately, researchers have not come to a consensus on the most suitable empirical estimation of precautionary saving. As a result, contradictory findings on the importance of precautionary savings have emerged.

⁴⁵ Each of these measures has its limitations. For example, variance in income might simply reflect cases where people have ‘noisier’ income records, rather than reflecting true unexpected income shocks as may be interpreted by the researcher. Meanwhile, subjective measures of risk may incorporate biases due to misinterpretation of questions by the respondents.

⁴⁶ As used by Swiss Re, for example, in evaluating the protection gap.

⁴⁷ Home equity is more liquid if homeowners can borrow against their housing equity.

Lusardi (1998) found significant evidence on the precautionary saving motive. She used data on the subjective probabilities of job loss, taken from the Health and Retirement Survey in U.S., to proxy income risk. Overall, by examining the risk effects on financial net worth and total net worth, Lusardi found significant evidence of precautionary savings, such that people who faced higher income risk also saved and accumulated more wealth. Results also indicated that households who were more risk averse, and who had long planning horizons, also accumulated more wealth – suggesting that risk aversion and prudence are positively related.

Carroll et al. (2003) used the ex-ante probability of job loss as a measure of risk to examine its effect on household wealth. Data was extracted from two American surveys - the Survey of Consumer Finances (for wealth data) and the Current Population Survey (for unemployment data). Their model clearly predicted a positive relationship between current unemployment risk and wealth. While it appeared that households with low permanent income did not engage in precautionary saving, moderate and higher-income households did portray precautionary habits, as shown in the escalating levels of net worth when unemployment risk increased. However, when home equity was excluded from total net worth, they found no evidence of precautionary motives, suggesting that people tend to hold precautionary wealth in the form of home equity. Several reasons may be offered to explain this observation, such as the possibility that areas with high home equity prices also had higher unemployment rates during the period of examination, or it may simply be due to the fact that housing equity could be more liquid than perceived, given the availability of home equity lines of credit.

Merrigan and Normandin (1996) estimated the coefficient of prudence to determine the strength of the precautionary saving motive. They used data from the annual U.K. Family Expenditure Survey (FES) which provides considerable consumption expenditure detail for a larger number of households (over 57,000) over a considerably longer period (1968-86). Econometric techniques were used to track each household's consumption movements over time and the findings revealed that greater uncertainty leads to larger current savings, consistent with precautionary saving behaviour. Furthermore, households which were less

likely to face liquidity constraints or to share risks were more sensitive to uncertainty. Those households whose head worked in industries with higher unemployment risk, such as manufacturing, were also more inclined to self-insure against uncertainty.

If insurance and precautionary saving are indeed substitutes then households who own more health insurance should have lower precautionary savings. All things being equal, households without health insurance face greater uncertainty in health expenses compared to insured households, and should thus have stronger precautionary motives to save in preparation of possible accident or illness. Thus, higher wealth holdings would be expected amongst uninsured households. In this regards, Starr-McCluer (1996) studied the relationship between health insurance ownership and wealth holdings in the U.S.. The 1989 Survey of Consumer Finances, which contains detailed information on households' finances, insurance coverage and health status, was used as a basis of empirical analysis. Starr-McCluer discovered that, in contradiction to the prediction of the precautionary saving hypothesis, uninsured households maintained much lower levels of wealth than other comparable insured households. This result persisted even when socio-demographic differences (e.g. income, age, education and work status) were accounted for. This suggests that savings and health insurance could be positively related due to unobserved variation in human behaviour, such as risk aversion and prudence. For example, uninsured households could have low levels of both risk aversion and prudence, and therefore hold low levels of precautionary savings⁴⁸.

The above studies on the precautionary motive have yielded contradicting results, mainly due to differences in methodology. The challenges faced by researchers are reflected in this statement by Carroll and Samwick (1998, p.410):

“A major obstacle to empirical estimation of theoretically attractive models has been that theory provides no analytical result that tells the researcher exactly how to measure uncertainty in a parsimonious way. In principle, optimal behaviour depends on even the minutest details of the income distribution, so that, for example, two distributions that exhibit the same mean and variance might induce quite different precautionary saving.”

⁴⁸ A more pragmatic reason for the finding is that households with low income may keep their asset holdings low to avoid discontinuation of government sponsored medical benefits.

The presence of other methods of preparing against risks, mainly insurance programs, makes the evaluation of precautionary accumulation more complex and challenging.

5.2.2 Life Insurance Demand

The existence of the protection gap implies that individuals choose to remain uninsured and expose themselves to the various risks of life. This phenomenon continues to perplex researchers and practitioners, and has resulted in numerous studies trying to offer valid explanations. Most of these studies focus on establishing demographic, as well as macroeconomic (e.g. inflation, indexation and interest rates) and microeconomic (e.g. price, demography and psychographic variables) factors that influence life insurance demand.

Zietz (2003) summarized the findings of twenty-six published articles relating to life insurance demand from 1967-2001, and reveals conflicting results. For example, age was found to be positively significant in three studies (Berekson, 1972; Truett and Truett, 1990; Showers and Shotick, 1994), but four other researches revealed negative correlations (Ferber and Lee, 1980; Auerback and Kotlikoff, 1989; Bernheim, 1991). In addition, six studies found insignificant relation between age and life insurance purchases (Hammond, et al. 1987, Duker, 1969; Anderson and Nevin, 1975; Burnett and Palmer, 1984; Fitzgerald, 1987; Gandolfi and Miners, 1996). This could be due to differences in data used and methodology employed.

Zietz also reports on a number of studies that investigate the relationship between life insurance holdings and financial/economic factors. Generally, financial variables (e.g. income and net worth) were positively related to life insurance demand (e.g. Hammond et al., 1967; Neumann, 1969; Ferber and Lee, 1980; Browne and Kim, 1993). Sensitivity of demand to price has also been investigated. Mantis and Farmer (1968), Babbal (1985), and Browne and Kim (1993) found that the demand for life insurance is negatively related to premium. Meanwhile, the effect of social security remains ambiguous, since some studies find positive relationship (Bernheim, 1991; Brown and Kim, 1993), while others find negative relationship (Lewis, 1989; Fitzgerald, 1987).

The relationship between life insurance demand and bequest motives has also been explored. Bernheim (1991) used data from the Longitudinal Retirement History Survey in the U.S., which followed more than 11,000 individuals aged 58-63. For the purpose of Bernheim's study, 2,767 households with positive life insurance holdings were taken as a sample. Results revealed that the desire to leave a bequest influenced the attitude toward insurance. Furthermore, it was found that the probability of having life insurance was negatively correlated with age, but positively correlated with the presence of children. The latter finding supports the view that individuals with children have a stronger propensity to leave bequeathable wealth in the form of life insurance.

A more recent study by Lin and Grace (2007) examined the life-cycle demand for different types of life insurance. They proposed a financial vulnerability index as an indication of a household's financial insecurity, to examine its effect on life insurance demand. Financial vulnerability in this context refers to volatility in household's living standards due to death of wage-earning household member, and is determined by using information on income, probability of death, consumption-income ratio, and the effect of age on future consumption needs. Data regarding household life insurance holdings from the 1992, 1995, 1998 and 2001 SCF was employed. Results showed that a significant relationship exists between financial vulnerability and term life insurance demand, as well as total life insurance holdings. In addition, the sensitivity of total life insurance to financial vulnerability declines with age, suggesting that younger households tend to use more life insurance to manage their financial vulnerability. On the other hand, the findings suggest that older households are more inclined to substitute higher-priced life insurance with other types of assets.

5.3 Precautionary saving and insurance: Complements or Substitutes?

The literature has shown that assessment of precautionary saving has been difficult due to measurement problems. In addition, the existence of insurance programs which also protect against similar risks make the evaluation even more complicated. Given the overlapping function of insurance and precautionary saving, a valid question to ask is whether they function as complements or substitutes. In other words, do people allocate funds exclusively in one or another, or do they have allocations in both forms to meet different objectives? Do insurance and precautionary saving protect against the same risks?

Ehrlich and Becker (1972) used expected utility theory to show that market insurance and self-insurance are indeed substitutes. These results have been confirmed empirically by other research. For example, Chou, Liu and Hammit (2003) used data from the Taiwanese Survey of Family and Income Expenditure observed that comprehensive health insurance reduces the uncertainty of future out-of-pocket health expense, therefore reducing the demand for precautionary saving. Hubbard, Skinner and Zeldes (1995) also showed that social insurance programs discourage savings by households in the U.S., in particular those with low expected lifetime income. Another America-based research by Kantor and Fishback (1996) discovered that group insurance (particularly workers' compensation) crowds out private accident insurance and depresses precautionary saving.

So far, these research studies indicate that there is a negative correlation between these types of insurance (health and social insurance) with precautionary saving. However, an exception is the work of Guariglia and Rossi (2004) which used data from the U.K. Household Panel Survey. Instead of observing a negative relation between private medical insurance and saving as had the other studies, they found a positive association between the two, implying that private medical insurance generally does not crowd-out private savings. This suggests that consumers do not find the need to substitute their precautionary savings with private medical insurance and may regard the National Health Service as being adequate to cover their needs.

The issue of whether insurance and precautionary savings are substitutes or complements has important implications. If people treat them as substitutes, then insurance and saving products are in competition. However, if they are complements, banks and insurance companies may be able to work hand in hand to provide comprehensive savings and protection needs to households and individuals. Either way, the fact that precautionary saving and insurance can be inter-related needs to be taken into account in financial planning advice and decisions.

6. CONCLUSION: GAPS IN KNOWLEDGE AND FUTURE RESEARCH

All human beings are exposed to risk, in the sense that they may experience unexpected and adverse outcomes which were not anticipated and cannot be fully controlled. The factors that influence the demand for protection against wellbeing risks (to life, health and income) are not much researched or understood. This is an important knowledge gap – since it coincides with considerable apparent underinvestment by the U.K. households in insurance, precautionary saving and other coping mechanisms that would alleviate the distress such risks can cause.

The main objective of this paper is to set out what is known about consumer decision-taking relating to wellbeing risk. Only by appreciating consumer motivations can we then understand why there is a protection gap. It is not our purpose to report on original research: we are more concerned to review existing findings, identify the gaps in knowledge, and set out a research agenda so that these gaps might be filled. We have identified at least four aspects of individual behaviour which have a material impact on the willingness of an individual to control of finance wellbeing risk:

- *Vitality* – which relates to the willingness to control the loss of utility associated with poor health or pain and suffering. This is a very under-researched phenomenon, but we believe that it will become increasingly important as more emphasis is placed on healthy living and lifestyle choice.
- *Risk aversion* – which relates to the extent to which individuals are affected by the possibility of volatile incomes. This is the primary driver of the demand for protection insurance.
- *Prudence* – this is the behaviour that motivates people to save for a ‘rainy day’. Savers with a high level of prudence will want to hold assets in a fairly liquid or marketable form to guard against possible fluctuations in future income.
- *Loss aversion* – this relates to the common phenomenon that a loss has a disproportionate ‘hurt’. High levels of loss aversion will make individuals particularly

sensitive to capital and counterparty risk and produces a disincentive to purchase insurance, and may lead them to prefer precautionary saving to insurance protection.

One obvious practical implication of this categorization is the need to reflect it in standard risk profile questionnaires and fact finders. Clearly, simple questions such as “what is your attitude to risk?” are unlikely to capture the full picture of an individual’s willingness to take wellbeing risks. More work needs to be done in designing simple questions which can be used to measure the various dimensions of a respondent’s risk attitude.

This review has also identified a number of areas where further work is required, which can be summarized under four main themes: (1) what do consumers know about their risk in relation to injury, illness and death? (2) how can the strength of an individual’s desire to protect against risks to life and financial wellbeing (as outlined above) be measured? (3) what is the link between the demand for protection insurance and precautionary saving? and (4) why do U.K. households under-invest in protection? These four themes establish a broad research agenda which is set out in the following pages.

RESEARCH AGENDA FOR FURTHER WORK ON PROTECTION AGAINST WELLBEING RISK

1. What do consumers know about the risk of injury, illness and death?

- How do people evaluate their personal wellbeing risk – as a annual probability, lifetime chance, reduction in life expectancy, reduction in total QALYs?
- Where do individuals obtain information about the personal risks to life, health and financial wellbeing?
- Do they trust the providers of this information?
- How much would people be prepared to pay for accurate information about such risks?
- Are people's perceptions about such risks accurate, or is the risk under-estimated?
- Do people have accurate information about the impact of any actions which can either increase the risk (eg smoking) or decrease it (via lifestyle choices)?
- Do individuals with a high willingness to pay (reflected in their vitality) adopt 'safer' lifestyles?

2. How strong is consumer desire to protect against wellbeing risk?

- What does the national distribution of vitality, risk aversion, and prudence look like?
- What factors affect an individual's willingness to pay (WTP) for a reduction in personal risk or an increase in total QALYs (that is, their vitality)?
- What factors affect an individual's risk aversion?
- What factors affect an individual's prudence?
- What is the relationship between vitality, risk aversion and prudence?
- What factors affect an individual's loss aversion? What is the distribution of this?

3. The link between desire for protection and insurance/precautionary saving

- What is the relationship between an individual's vitality and lifestyle choice and insurance (critical illness, accident & sickness)?
- What is the relationship between an individual's risk aversion and purchase of income protection insurance?
- What is the relationship between an individual's prudence and precautionary saving?
- Do individuals with precautionary saving hold more or less insurance?
- Are savers loss averse?

4. Why is there a protection gap?

- What is the price dispersion for protection insurance?
- Do protection insurance prices match the risk?
- Do people search for best-buys (price and cover) in protection insurance? How much do they search?

- What is the evidence for adverse selection and moral hazard in protection insurance markets?
- What are the implications of asymmetric information for precautionary saving?
- Do people with lower levels of perceived risk hold lower levels of insurance and precautionary saving?
- What levels of insurance protection and precautionary saving can be expected from the national distribution of risk aversion and prudence (given the current distribution of insurance prices)?
- Are particular types of household 'excluded' from protection insurance (either 'price excluded' &/or 'access excluded')?
- What product features would make protection insurance more attractive?

Appendix: A Brief Explanation of Subjective Expected Utility Theory

A widely accepted model for examining individual decision making in the presence of risk is the expected utility theory, a theory largely developed and influenced by von Neumann and Morgenstern (1948). According to the theory, in a situation where a decision maker has to choose between risky prospects, he or she will compare the expected or average utility (happiness) between the risky prospects and choose the one that gives the highest expected utility or satisfaction. The expected utility theory assumes that individuals behave in a rational and fully-informed manner: that they consider both the outcomes and the associated probability of alternatives, and make decisions which obey strict axioms of choice (which rule out illogical or contradictory decisions) and conform to the rules of probability.

In the expected utility model where investors are generally assumed to be risk-averse, the effect of risk on the level of satisfaction of an individual can be determined empirically. For a risk-averse investor, the functional relationship between utility and income is concave to the horizontal plane, as illustrated in the left-hand figure below. It shows that the slope of the function $u(y)$, representing the utility of income y , declines with income, implying that further increments in y increases utility but at a decreasing rate - an additional pound of income is less important when the individual is rich than when the individual is poor.

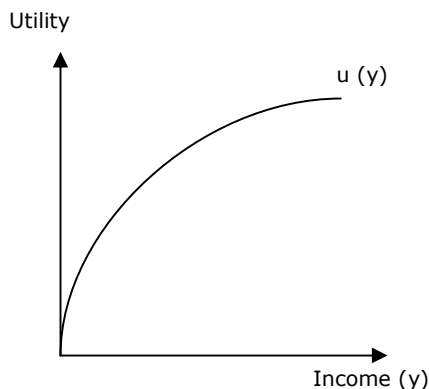


Figure 1: Utility function of a risk-averse individual

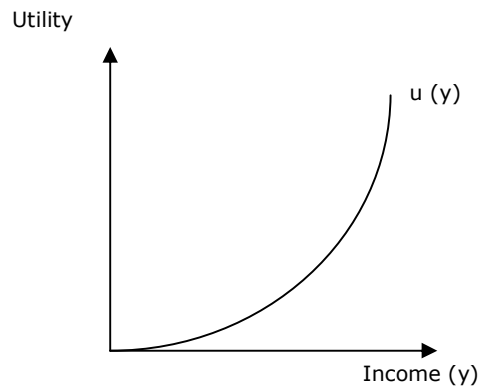


Figure 2: Utility function of a risk-lover

For investors who are risk-neutral, their utility function will exhibit a linear utility function, represented by an upward sloping diagonal line. The slope of the line indicates a constant marginal utility of income, that is, incremental escalations in income increases utility at a

constant rate. On the other hand, an investor who is a risk-lover has a utility function which is convex to the horizontal axis, as shown in right-hand figure. The slope of the function shows an increasing rate of marginal utility – implying that higher levels of income will increase utility at an increasing rate.

The first-order derivative or slope of the utility curve, $du/dy = u'(y)$, is always positive, no matter what are the individual's risk preferences, since we assume that she always prefers to have more income. However the second-order derivative, $u''(y)$ is either negative, zero or positive, depending on whether the person is risk-averse, risk-neutral or risk-loving respectively. From the concavity of the utility function, Pratt (1964) and Arrow (1965) developed formal measurements of the risk aversion. They showed that absolute risk aversion, $a = -u''(y)/u'(y)$ and relative risk aversion, $r = -y \cdot u''(y)/u'(y)$ is the income elasticity of marginal utility. This enables one to distinguish between the various risk attitudes of individuals - a risk averse individual would have a positive r figure, a risk neutral individual would have a zero r value, while a risk lover would have a negative r figure. Furthermore, a larger positive value of r indicates a greater degree of risk aversion.

The estimation of risk aversion in the context of expected utility has been used to study individuals' behaviour in their demand for insurance. The expected utility theory offers a sophisticated approach which can assist to improve insurance providers' knowledge on the attitudes of their potential customers. Nonetheless, the theory has often been criticized as failing to fully explain actual behaviour of individuals in risky situations and fails to explain insurance purchasing behaviour. The complexities regarding insurance buying behaviour are also due to the fact that the demand for insurance usually arises in the context of some other transaction and that insurance is usually purchased as a means of satisfying more basic needs (Ehrlich and Becker, 1972). Further detailed explanation can be found in Eeckhoudt, Gollier, and Schlesinger (2005) and Eisenhauer (2000).

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