Association of British Insurers

The Economic Value
OF GENERAL INSURANCE

If insurance did not exist a large proportion of the rest of the economy would not exist either. Without a reliable mechanism for pooling and transferring risk, much economic activity simply would not take place.

Centre for Risk & Insurance Studies
Enhancing the understanding of risk and insurance
A report for the Association of British Insurers

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1. INTRODUCTION TO INSURANCE

1.1 Outline of the Report

This report provides an overview of the value of the general insurance[1] industry to the UK economy.

There is no simple way to measure the economic value of an industry, especially one with an intangible product such as insurance whose primary use is the control of risk. If we consider, for example, the motor manufacturing industry, there are clearly some tangible output measures readily available such as the number of cars produced, and the value of cars sold. In the case of insurance, there are several difficulties in establishing comparable measures of output. The monetary value of premiums, claims, investment income and assets have often been used as alternative measures of what the industry produces. Although these are useful indicators of the size of the industry, they fail to reflect the contribution of insurance in providing security, investment and risk management services, and in contributing to economic growth.

Therefore, the report examines a combination of qualitative and quantitative approaches and considers the value of insurance in the following ways:

- A consideration of insurance and economic growth – a look at how insurance facilitates risk taking and the creation of wealth;
- A qualitative assessment of how insurance contributes to the economy in other ways;
- An assessment of the value of insurance in terms of the output and value added of the industry through analysis of National Income accounts;
- An analysis of the interactions between the industry and other sectors of the economy, using data from the supply-and-use tables issued by the Office for National Statistics; and
- A review of the interrelationship between insurance and other sectors of the economy though an economy-wide model. This is used to demonstrate the effect of changes in insurance demand and of insurance premium tax on the economy.

1 The terms general, non-life, and property/casualty insurance can be used interchangeably. For the purposes of this report, "insurance" is used for all these terms

1.2 What is Insurance? How did it develop?

Insurance is one of the best-known and most valuable ways of protecting against the risks associated with every day life. This protection is achieved by a contractual arrangement between an insurer and an insured customer. The insurer promises compensation if an accidental event occurs which causes the customer to suffer a financial loss. The risk of suffering such financial loss is then transferred, in whole or in part, from the customer to the insurer. In return for accepting the burden of paying for losses if and when they occur, the insurer charges a price – the insurance premium.

Although insurance may be thought of as a contract transferring risk between insured and insurer, it is also important to understand that this is achieved primarily via the pooling or sharing of risk by a group of insured customers. This pooling occurs because insurers collect premiums from a group of similar customers, and then pay valid claims out of this pool of premium contributions. These premiums therefore form the primary resource available to insurers for meeting claims. The principal roles of the insurer are therefore:

1. to organise this pooling and sharing process – that is, the estimation, collection and investment of premiums, and the investigation and payment of claims; and
2. to provide additional capital backing in case the collective outgoings from the pool (in terms of claims and expenses) exceed its total income (being mainly premiums and investment earnings).

Insurance developed when primitive societies found themselves unable to support trade and business activities because of the significantly increased size and frequency of losses involved. Marine insurance developed in response to the need of traders and merchant adventurers to share the speculative risks arising from their business activities.

Although the origins of insurance are shrouded in obscurity, it is generally believed that insurance originated in the Babylonian civilization of c3000BC[2]. Indeed the earliest documented reference to insurance practices dates from around 2250BC when the Code of Hammurabi set out the circumstances under which compensation could be received, or loans forgiven (as in bottomry and respondentia loans on maritime contracts[3]) following certain accidental events.

Bottomry and respondentia bonds were then taken up by the Phoenicians and the Greeks as a means of protecting against losses involved in trade in the Aegean Sea in the 8th century BC, and it is thought that the Athenians also developed an early form of insurance market for the exchange of information. The Greek traditions were adapted by the Romans and historians believe that the first formal contracts resembling insurance[4] date from the Roman Empire between 200BC and 60AD. The Romans were also thought to have instituted the first life and health insurance via organised burial societies.

2 Further information on the historical development of the British insurance market can be found in Clayton (1971), Diacon & Carter (1992) and Westall (2001)

3 Bottomry and respondentia bonds were loans to the master of a ship, pledged on the ship or its cargo, which were only repayable on the completion of the voyage

4 In the sense that a premium of sorts was paid an individual acting as insurer in return for a promise to replace valuable property following loss arising from specified perils

In the medieval period in Europe, the mercantile communities based in Italian city states issued formal marine insurance documents, and the first such example was written in Italian and dated from 1347. Custom and use among Italian merchants brought an element of uniformity in marine insurance practice (e.g. in terms of the perils covered by the contract), and their commercial practices spread across Europe to the Low Countries, Spain and England. These marine insurance contracts were generally exchanged on a reciprocal basis between port-based merchants and mariners who knew and trusted each other and were able to share their exposure to similar perils.

With the discovery of America, international trade turned trans-Atlantic and London developed as the key European trading centre. However marine insurance still tended to be based on reciprocal arrangements between merchants on relatively small ventures. As international trade developed, it soon became necessary to harness capital from outside the merchant trader community in order to spread risk more widely. This led to insurance contracts becoming increasingly formalised and then regulated with the creation of the Chamber of Assurances within the Royal Exchange in London in 1576. The result was greater standardisation of marine insurance policies and practices, and the realisation of the benefits of pooling large numbers of similar risks. A professional class of underwriters also emerged who were capable of providing coverage to larger trading ventures via the utilisation of their own capital. The formation of Lloyd's of London dates from around 1690, originally as a place for the completion of mercantile transactions, and later for underwriting marine insurance.

These early forms of insurance were used virtually exclusively to cover risks arising from commercial trading ventures. Insurance developed as an instrument to enable merchants to take business risks and generate wealth on a proactive basis. Insurance for households, as opposed to merchants, did not emerge until the seventeenth century – as a direct response to the destruction caused by the Great Fire of London in 1666.

Fire insurance was initially confined to houses, although business premises and small warehouses were soon included. Fire insurers faced real problems in extending coverage to larger business premises because of the relative lack of capital and the difficultly of classifying risk. Wholesale utilisation of insurance across the economy requires accurate risk classification in order to ensure that the bad risks are not subsidized by the good. This

classification is not simply a matter of improved data collection and underwriting, but relies on a scientific analysis of risk factors (i.e. the identifiable and measurable factors which are highly correlated with loss experience). Around 1720 risk classification was introduced by London insurers which enabled insurance to be offered to hazardous trades. Initially this was limited to discriminating between brick and timber buildings, where the premium on timber was double that on brick. However in 1721, the Sun Insurance Office (which had been formed in 1710) introduced a more comprehensive classification, whereby sixteen hazardous trades (such as bakeries and distillers) were identified and charged higher rates.

The reciprocal pooling of marine risks among traders was possible because they had some personal knowledge of each other's risks and reputations. However the involvement of 'outside' capital (at first from individual underwriters, and subsequently via joint stock insurance companies) and the widening of insurance activity meant that personal knowledge had to be replaced by trust. Instead of knowledge based on personal acquaintance, policyholders needed to trust that their insurer had enforceable contracts, proper procedures, sufficient capital and competent management.

Insurance developed as means of managing the risks arising from commercial trading ventures. The key features of modern insurance are, it:

- goes beyond mutual risk-sharing;
- necessitates a large pool of risks;
- depends on accurate risk classification and loss data;
- depends on trust.

These emerged at key stages in the development of insurance and enable its wide application to managing risk today.

2. INSURANCE AND ECONOMIC GROWTH

2.1 Introduction

The development of insurance as a financial tool clearly demonstrates it has a role in assisting economic growth. As outlined in the introduction, insurance was developed to enable wealth creating ventures to be undertaken.

Measuring the contribution of insurance to economic growth is far from simple. We can construct a crude estimate of the role of insurance in underpinning other economic activity. From the beginnings of the establishment of modern corporations in the 17th century, insurance markets have been one of the key features that have fostered trade and industrialisation. The national income in England and Wales in 1688 has been estimated to have been £54.4[5] million, or £6 billion in current prices, the equivalent of 0.6% of today's GDP. The trend rate of national income growth between 1688 and 1759 was only 0.007% per year, and even in the early industrialisation period of 1760-1800, it only crept up to 1% per year. Had the UK economy continued to grow at this rate, UK GDP today would only be £66 billion, as opposed to the current £1000 billion. How much of this additional growth we can attribute to insurance is impossible to say, but the scale of the economic improvement wrought by the commercialisation of our economy leaves no doubt that we would be living in a very different and less prosperous world without the insurance industry.

Insurance now plays a crucial role in the modern economy as Kenneth Arrow, the Nobel Prize winning economist commented:

"The non-existence of markets for the bearing of some risks in the first instance reduces welfare for those who wish to transfer those risks to others for a certain price, as well as for those who would find it profitable to take on the risk at such prices. But it also reduces the desire to render or consume services which have risk consequences" (Arrow, 1963, pp945-946)

Insurance offers important economic benefits where activities are seen as risky and a risk control or transfer mechanism is needed. Where societies are indifferent to risk, or alternative risk transfer mechanisms such as the family are seen as important, then the characteristics of the social fabric of a given society will reduce the potential need for insurance. The economic benefits of insurance will depend on the cultural context of an economy.

Outreville (1990) investigates the economic significance of insurance in developing countries. He focussed on developing countries because many governments have decided to establish new financial institutions under a "supply-leading approach" to financial development. He compares 45 developed and developing countries, and concludes that there

5 P H Lindert and J Williamson, "Revising England's Social Tables" 1688-1913, Exploration in Economic History (1982)

is a positive but non-linear relationship between general insurance premiums per capita and GDP per capita. Although there is undoubtedly a positive link between insurance and economic growth, the direction of causation between the two is unclear[6]. Recent research by Ward & Zurbruegg (2000) suggests that in some countries, the insurance industry plays a key role in economic growth.

An alternative to the insurance industry is the wholesale provision of coverage by government. But this is not a realistic solution as it is widely recognised that the provision of insurance by governments often serves to increase rather than reduce the aggregate levels of risk in the economy. As Priest (2003) notes, the US government's safety net for savings and loans deposits only served to increase the risk-taking (and hence bankruptcy) of many of these organizations. And government provision of disability insurance increases the disability claims rates, especially among older workers[7].

2.2 The Role of Insurance in Enabling Wealth Creation

The role that insurance fulfils in enabling economic development is not readily transparent. The following simple example illustrates how an insurer, which provides a means of sharing risk, enables trade and the creation of wealth.

No insurance – no wealth creation

Suppose there are two independent merchants considering a business venture[8]. They both have wealth of 100,000 and are prepared to invest 90% of this to make a profit, provided that the profit is high enough to compensate them for the risk.

Let's presume that the merchants have a 90% chance of doubling their investment to 180,000; unfortunately there is also a 10% chance that the 90,000 will be lost. So, each merchant's wealth would increase to 190,000 if the venture is successful, but fall to 10,000 in the event of failure.

Over time, each merchant would expect to make a profit of 72,000 on average (the average expected profit is 72,000 = 0.9(+90,000) + 0.1(-90,000))[9]. However they can only do so by taking an 'all or nothing' risk – their return on capital is either +100% or – 100%. Unfortunately, given the merchants' dislike of risk, the benefits of the venture are likely to be more than outweighed by the risks involved[10]. Therefore, without any insurance or risk-sharing, the merchants would not invest and no wealth creation would take place.

However if the merchants could reduce their risk in some way, they may be prepared to go ahead with the venture and so create 144,000 of additional wealth, on average, in the economy.

6 In other words, to what extent does insurance contribute to economic growth and to what extent does economic growth stimulate the development of an insurance sector
7 The presence of disability insurance creates a moral hazard; medical tests are used in part to offset this risk
8 All the figures in this section are derived from a model where the merchants and the 'insurer' dislike risk, and have a constant relative risk aversion (CRRA) utility function with the CRRA parameter set equal to 2. Where necessary, the insurer is assumed to have an expense ratio of 10% of premiums
9 Producing an average return on the capital at risk of 80%
10 Since their dislike of risk is such that the expected utility generated by the risky venture is less than that derived from the certainty of 100,000

Suppose that a third person, acting as an insurer, is prepared to offer the two merchants some alternatives to reduce their risk. Four simple risk sharing arrangements[11] are available, which offer progressively higher levels of cover:

(i) The two merchants share each other's success and failure (ie they pool their trading profits) and the insurer's role is limited to helping them organise this risk pooling.

(ii) The insurer contributes one third of any loss, as well as organising the merchants to pool the remainder. To achieve this, the insurer will of course need capital to ensure that all claims on it are met.

(iii) Each merchant retains one-third of the risk (as in (ii)) but relies exclusively on the insurer for the remaining cover. This increases the capital requirements for the insurer.

(iv) The insurer offers each merchant full insurance cover against trading losses.

The Value of Insurance

The results of the simple analysis are set out in the Table 1. It shows that insurance is of value to the merchants in reducing risk, and most crucially, in enabling them to proceed with their business ventures which increase the overall wealth in the economy by an average of 144,000.

Each of the four insurance alternatives has a successively lower level of risk, as the amount of insurance cover is increased. The Table shows the maximum amount that the merchants are prepared to pay for the (rising) insurance cover associated with each alternative. The example shows that, as the level of insurance cover increases (and the merchants' risk therefore reduces) the capital requirements imposed on the insurer[12] become more onerous.

In alternative (i) the two merchants share each other's success and the role of the insurer is limited to helping them organise their risk pooling. In this case, each merchant is prepared to pay up to 56,500 for the insurer's pool-organising services. The figure of 56,500 is the maximum each merchant would pay for the risk pooling – which would then reduce risk sufficiently to make the venture attractive[13].

In (ii) the insurer contributes one third of any loss, as well as organising the merchants to pool the remainder: each merchant is prepared to pay up to 60,900 for the organising and risk transfer service. However the insurer will need minimum capital of at least 11,534 to ensure that all claims are met. Alternative (iii) is a natural extension of the second, whereby each merchant retains one-third of the risk but relies exclusively on the insurer for the remaining cover and pays up to 78,300 for it. This imposes considerable capital requirements of 110,067 on the insurer to guarantee that all claims can be paid. Finally in (iv) the insurer offers each merchant full insurance against trading losses: the value of this service is reflected in the maximum premium payable of around 89,900 – in part to compensate the insurer for the increased capital requirement.

11 A full description of the construction of these risk-sharing models is outlined in separate Appendix 1
12 That is, the capital required to ensure that any claims payments can be met in full
13 So that the expected utility from the venture exceeds the utility of 100,000 for doing nothing

Table 1: The Value of Insurance

Type of Insurance Service	Maximum ex ante value added by insurance for each merchant[17]	Minimum insurance capital
None	0	0
(i) The 'insurer' organises risk pooling but takes no risk itself.	56,500	0
(ii) Risk pooling and 1/3 risk transfer	54,900	11,534
(iii) No pooling but equivalent partial insurance (i.e. 2/3 risk transfer)	66,300	110,067
(iv) Full insurance (i.e. 100% risk transfer)	71,900	220,200

The value of insurance can be measured by the maximum amount that the merchants are prepared to pay over and above any expected claims, termed the 'maximum ex ante value added'[14]. Table 1 illustrates that the merchants are prepared to pay for the insurer's services, because these reduce risk. Each of the four insurance alternatives offers the merchants progressively more coverage (and hence lower risk) and this is reflected in the increasing amount that they are prepared to pay.

In this example, full insurance (ie option (iv)) is the most valuable insurance option since each merchant is prepared to pay up to 71,900 (on top of the expected claims recoveries) for the cover, and is then able to enjoy a guaranteed wealth of 100,100 without any risk of a loss[15].

If full insurance was not available for any reason (for example, because the insurer did not have the minimum capital of 220,200) then the merchants would be forced to turn to the next best alternative – partial insurance offering two-thirds protection (option (iii)): however they would each only be prepared to pay up to a maximum value added of 66,300 because of the additional risk they have to bear themselves. If option (iii) was not available (again because the insurer may not have access to the minimum capital of 110,067) then the merchants would probably choose option (i) and pool their own risk without turning to an insurer to take a share, although still be prepared to pay up to 56,500 for the organisation of this pool.

The example illustrates the indispensable role of insurance in this small economy. If no insurance is available, the merchants will attempt to pool their risks and share each other's losses – and would be prepared to incur sizeable administrative costs to do it. If this pooling is not possible, the only option left to the merchants is to cease their wealth creation activities altogether.

14 Of course if they decide to go ahead with their venture, the merchants will have to bare the costs of the expected claims, either through insurance premiums or directly when suffering a loss. The value added by insurance lies in the amount that the merchants are prepared to pay in excess of the expected claims; this is also sometimes known as the risk premium or the cost of risk. If the merchants did not value insurance or risk sharing, they would not be prepared to pay for it (since such insurance is voluntary), and the maximum ex ante value added would then be zero

15 Taken together, the two merchants and the insurer put total capital at risk amounting to 378,180 and earn an overall average return on capital of 38.1%. Of course, the merchants will be able to earn a higher return on capital if insurance is offered at a lower price, but the insurer will then require more capital to ensure that all claims can be paid

2.3 An Introduction to the Problems of Measuring the Contribution of Insurance

The example in the previous section also illustrates some of the issues that will arise later when evaluating the output of the insurance industry.

There is a paradox in measuring the contribution of insurance to the economy, since the value added generated by the availability of insurance is shared between the merchants and insurance industry. Furthermore the more competitive the insurance industry, the less value is attributed in traditional forms of insurance output measurement.

To illustrate the first point, consider alternative (i) where each merchant pays a maximum premium of 56,500. The insurance industry's output or value added is only 133,000 even though the availability of the insurer's risk pooling advice enabled the economy to benefit by 144,000. Thus the contribution of insurance to the economy is under-stated because it omits to measure the contribution generated by the merchants (of 11,000) which would not have been possible in the absence of insurance.

To illustrate the second point, consider the case of full insurance (iv) in the above example, where the insurer could charge a maximum premium of up to 89,000. This generates the greatest possible ex ante value added for the insurance 'industry' (of 143,800), which provides a close approximation of the true contribution of the insurer in enabling the creation of total wealth of 144,000. However if the insurer were to charge a competitive premium of 20,000[16] and therefore generate a total ex ante value added of only 4,000, then the contribution of insurance in generating total output of 144,000 would be substantially under-estimated.

Further confusion arises in practice, when the output and value added of insurers is measured on an ex post (Premiums plus investment income minus claims – 'P+I-C') basis (as in chapter 4). Thus the value under this form of measurement fluctuates depending on the claims experience.

In the case of full insurance, the ex post output of the insurer could vary between +179,800 if no claims occurred, -200 if one claim was paid, or –180,200 if both merchants made claims. Clearly the figures for insurance output need to be treated carefully in trying to establish a picture of the 'true' contribution of insurance to the economy.

16 Sufficient to cover average claims (18,000 – where each merchant has a 10% chance of making a 9,000 claim) and administrative costs (at 10% of premiums)

2.4 The Importance of Insurance in the Modern Economy

Although it is not possible to scale up this simple model to replicate the whole economy, there is no doubt that insurance plays an equally crucial role in the modern economy.

A real world example of how insurance supports risk-taking is the development of North Sea oil in the 1970s. The fixed oil drilling platforms in the North Sea, which operated in conditions and at depths which were more adverse than previously experienced, were insured through the London insurance market. The financial capacity of the London market, and its willingness to insure new and very expensive technologies, enabled the development of the North Sea oil supplies[17].

It also allows the economy to face potentially serious problems. Since the IRA mainland bombing campaign of the early 1990s, UK insurers have worked with the Government to provide terrorism cover to businesses. Available to all, this insurance has enabled businesses to continue to operate in perceived high risk locations such as the City of London and Canary Wharf and has, in particular, safeguarded London's position as the premier financial centre in Europe. A loss of just 10% of business, a distinct possibility had foreign investment banks withdrawn from London due to non-availability of insurance cover in 1993, would have reduced GDP by £20bn per annum.

Another example of the importance of insurance to the UK commercial sector is provided by the experience of UK firms following the liability insurance crisis[18] of 2001/02 following the sharp contraction in the capital markets and insurance capacity after 11 September 2001 (OFT, 2003). Although little evidence was found that businesses facing higher insurance prices were either trading illegally (i.e. without compulsory employers' liability insurance) or closing down, the increases and restrictions none-the-less forced many smaller companies to scale down their trading activities and reduce their risk-taking (DWP, 2003).

17 Under circumstances which prevented the local (Norwegian) insurance market from active participation. For further details see Heimer (1985)
18 When average premiums for employers' liability insurance increased by 50% and those for product and public liability by between 30 and 40%

If insurance didn't exist, it would be created!

In cases when commercial insurances (covering property, liability, pecuniary and transportation risks) is not available to business, alternative risk sharing mechanisms arise to fill the gap. For example, in the mid-1980s a crisis in the US liability insurance market[19] dramatically reduced the levels of cover available, particularly to large industrial companies, with a consequent sharp increase in premium levels. The response by US manufacturing industry was immediate and new mutually-owned insurance groups were quickly set up in Bermuda to replace the missing insurance cover[20]. This episode was summed up by Chairman and CEO of the newly created insurance company, ACE Limited, thus:

"By 1985, however, insurance capacity for large liability risks had all but dried up. The free ride was over and the insurance cycle had turned hard. As a result, Marsh McLennan and JP Morgan teamed up to create a high excess liability underwriter that would provide single risk capacity of $100 million in excess of a $100 million retention. The two sponsors passed the hat around to a number of the world's largest industrial companies who chipped in the odd million or two bringing ACE's initial capital to over $100 million... Attempts to name the new company American Casualty Excess were unsuccessful and so ACE (standing for nothing in particular) was formed. Once successfully off the ground the sponsors thought: "If we can provide $100 million excess of $100, why can't we drop down and create a company that will write $50 million in excess of $50 million?" and so EXEL Capital was formed. The rest is history" Duperreault (2003).

19 Harrington & Danzon (2000, p297) say that 'possible explanations that have been proffered and analyzed [for the crisis] include changes in the discounted expected cost of providing coverage, adverse selection, negative shocks to insurer capital from unexpected growth in claim costs, excessive price cutting by some insurers in the early 1980s, and alleged insurer collusion during the hard market'

20 Essentially, these were risk-sharing pools – as in Alternative (i) in Table 1

Seven more companies were set up in Bermuda within a few months of the contraction of the US reinsurance markets following the losses arising from Hurricane Andrew in 1993. A sharp reduction in the availability of insurance is quickly followed by a period of 'reinvention', either with new capital insurance companies or by the creation of formalised risk-sharing pools. In other words, if insurance didn't exist, it would quickly be invented.

3. A QUALITATIVE ASSESSMENT OF THE ECONOMIC VALUE OF INSURANCE

3.1 Introduction

Insurance is bought by millions of people, but the range of functions it performs is not always well-understood.

In later chapters, the report explores quantitative methods of placing a macroeconomic value on insurance. However, some of the ways that insurance provides economic value cannot be readily quantified and are discussed in qualitative terms in this chapter. They are:

- Risk transfer – risks previously borne by the policyholder are now borne by the insurer, hence providing the policyholder with security.
- Risk-based pricing – insurers set premiums depending on the risk.
- Insurance supports tort liability law – without insurance operation of tort law based on third party liability would not be possible.
- Investment function of insurers – insurers are investors.
- Advice on risk management.

3.2 Risk Transfer

3.2a Insurance as a provider of security

Insurance provides security to individuals and firms, enabling them to undertake risky activities that they would otherwise refrain from.

Individuals and households

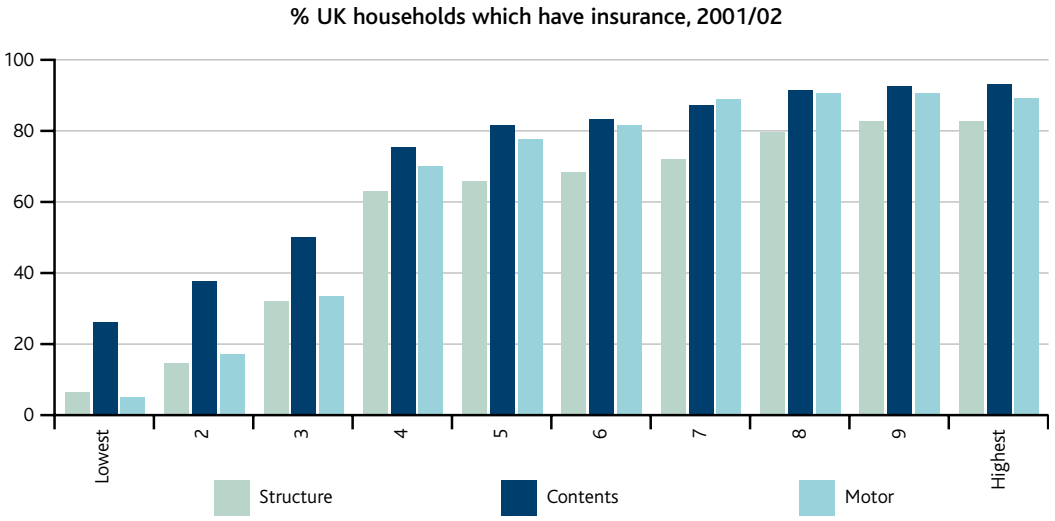
The key driver of an individual's insurance purchase is risk aversion. Individuals are said to be risk averse if, when choosing between two risky alternatives that have the same average outcome, they choose the option with the least variability[21]. A risk averse person will then be prepared to purchase insurance in order to protect her income or wealth from adverse fluctuations as a result of a loss. The insurance also means that people do not have to depart from their preferred spending patterns in order to make good an unexpected loss from current resources[22].

Insurance means that individuals do not need to retain as much wealth in liquid precautionary savings to protect against risk. So individuals' requirements for liquidity are less than otherwise. This means they can more easily purchase consumer durables and make longer-term investments: they gain as they can then expect a higher rate of return, while at the same time this facilitates the functioning of the capital markets.

Ward & Zurbruegg (2000) note that insurance further supports the functioning of the market expensive items, such as cars, by offering risk transfer and indemnification services to risk-averse individuals. This encourages such individuals to make purchases that they would not otherwise have made. Thus insurance provides positive externalities in terms of increased purchases, profits and employment both within and alongside the insurance sector. In addition, insurance facilitates innovation within an economy by offering to underwrite new risks.

21 Suppose a person has a house worth £100,000, and there is a 0.009 probability that it will be destroyed within the next year. The average or expected value of the loss is only £900 (ie 0.009 x £100,000), but the actual loss varies between £0 and £100,000. A risk-averse person will choose to purchase property insurance at a premium of £900, and is prepared to pay more than £900 to insure the risk. Risk aversion was the driver behind the purchase of insurance by the merchant venturers in Chapter 2

22 For example, uninsured damage to the family home (requiring expensive building work to the roof, say) may mean the cancellation of this year's holiday to pay for the repairs



This is particularly relevant to insurance of private residential homes. If structure and contents insurance did not exist, it is a difficult to imagine ordinary households wishing to invest most of their wealth in a single property. Without insurance, alternative forms of tenure might be created that spread risk, such as renting from commercial landlords who could spread their risks over a larger number of properties. In this way, insurance supports the private housing market and enables ordinary families, of comparatively limited liquid resources, to be homeowners[23]. The UK housing mortgage market supplied £100 billion in net advances in 2003 and enables almost 70% of UK households to own their homes. The housing market is reliant on the availability of property and creditor insurance; over 3 million mortgage loans are covered by mortgage payment protection insurance.

The importance of insurance to the UK household sector is demonstrated by analysis of the Expenditure and Food Survey undertaken for the ABI, which reports household expenditure on insurance. These figures indicate that the average UK household spend on insurance was £794 per annum in 2002/03. Around 71% of households purchased motor insurance, 64% purchase house structure insurance and 78% house contents coverage. The following chart shows the percentage of households holding personal lines insurance cover, broken down by gross income decile[24].

For businesses and organisations

Businesses have a substantial demand for insurance beyond protection against loss of physical goods, such as losses from business interruption and the occurrence of liabilities to third parties.

A survey of 373 of the largest 500 UK non-insurance companies, undertaken in 1998, indicated that the following factors were most important in explaining why the companies undertook their existing insurance coverage. The main findings are summarized in Table 1. The average annual premium spend was £7.6 million: 42% of respondents reported that they insured up to 80% of their insurable risk[25].

23 Thus insurance also assisted in the expansion of democracy in the UK, as the extension of the vote was initially limited to homeowners
24 See Davanna (2003) for a full explanation
25 See Main (2000) for further details

Table 1: Why do Large Corporations Purchase Insurance?

Rank	Reason	No.
1	Primarily covers us against catastrophic losses	103
2	Protects company cash flow hence avoiding financial distress	99
3	A stable earnings pattern is important	101
4	Insignificant savings on insurance from increasing risk	100
5	Reserves could be put to better use	99

Source: Main (2000)

Of course, employers' liability insurance is compulsory by law: in the event of an accident at work that causes injury to employees, the insurance policy provides funds to compensate employers for any liabilities incurred. In this way there is protection for both employer and employees. There are a number of other forms of liability insurance, some of which (e.g. professional indemnity insurance) are also compulsory for specific types of business. Product liability insurance covers losses to consumers on a strict liability basis as a result of injuries arising from the use of firm's products or services.

Although risk aversion plays a key role in explaining the purchase of insurance by individuals, it does not necessarily explain the corporate insurance purchases. This is firstly because the idea of risk aversion is not easily applied to a firm, since risk aversion is essentially a human preference[26].

Secondly, the shareholders that own publicly-quoted capital firms can diversify their unsystematic risk through their share portfolios.

The theory of diversification suggests that the shareholders in large PLCs should not be unduly concerned by firm-specific losses[27] within well-diversified share portfolios even though they may be risk averse. Shareholders will expect some of the shares in their portfolio to do better than expected and others to do worse. Overall these fluctuations will even-out in a well diversified portfolio. Thus diversified shareholders need not be concerned about the risk of an adverse event to a specific firm as they have already protected themselves from firm-specific risk through their portfolio (i.e. a form of 'home-made' insurance). They do not need each firm they have invested in to protect them again by buying insurance, especially as this means paying a premium to an insurer for organising the risk sharing.

26 Even if one considered the risk aversion of owners or managers, it is unclear which individual would be chosen to represent the firm. Furthermore groups of individuals may have contradictory preferences, and do not behave like individuals

27 That is, losses that are particular to a firm as opposed to affecting many firms

In spite of these arguments, there are a number of important reasons why firms nevertheless buy insurance, not least because not all shareholders have well-diversified portfolios:

1. **Not all firms are owned by shareholders with well-diversified portfolios.** The UK economy is dominated by small firms: 99% of UK companies employ fewer than 250 people. The small business sector employs around 55% of the UK workforce and produces around 51% of the total UK business turnover. In many small businesses, the owner (and maybe other shareholders too) has a large proportion of his wealth tied up in the firm. As such, the owners are not able to diversify away the firm-specific risk and will therefore have to rely on other market mechanisms such as insurance to manage risk.

   This is also true for some larger firms, that have owners without diversified portfolios; mutual organisations, where the owners are the customers of the firm; and non-profit organisations[28].

2. **To lower the costs of 'financial distress' or bankruptcy.** Insurance can provide the resources which may prevent bankruptcy or financial distress in the event of loss, and this will benefit all stakeholders because it avoids the inherent costs associated with bankruptcy and financial distress.

   If the firm suffers a large loss that depletes its financial resources significantly, it may incur additional costs such as higher interest rates on borrowing. If the firm is approaching insolvency, there are likely to be additional costs of auditors and lawyers, and management time. Bankruptcy proceedings impose similar costs[29]. Even if the firm can stave off bankruptcy, it may be obliged to liquidate assets quickly and suffer the losses of a distressed sale.

3. **Although shareholders may have diversified portfolios, other stakeholders do not.** As such, they would need to be compensated for participating in a risky business. It would be rational for a firm to buy insurance if its cost were less than the compensation which would otherwise be paid to risk averse stakeholders.

4. **Directors and senior management may have substantial human capital invested in the firm.** Shareholders may find that they have to pay greater remuneration than otherwise if the firm is unwilling to purchase insurance. Of particular relevance here is the nature of executive remuneration: if it exposes managerial pay to random fluctuations (performance-related pay, or a sizeable equity stake) it may stimulate management to reduce those fluctuations via the purchase of insurance[30].

5. **Customers have an interest in a firm's stability.** Customers may prefer to trade with a firm that they expect to continue in business. This reduces their search costs and enables them to plan more confidently and take advantage of a longer-term relationship. The price they are willing to pay for the firm's goods or services may be lower if the firm is perceived to have a risky future, and this provides an incentive to insure. In addition, if the goods or service expose the buyer to some risk, the buyer is likely to insist on the producer having insurance cover so that any warranty can be made good.

6. **Purchasing insurance can help resolve the conflicts of interest among the firms' various stakeholders.** If a firm buys insurance, this may be a signal to potential bondholders[31] or lenders that the firm is low risk, thus inhibiting equity holders from increasing risk at the expense of lenders. This may lead bondholders to charge a lower interest rate. Insurance can also help address under-investment where neither equity holders nor fixed interest lenders have a strong incentive to inject new capital following a loss.

7. **Firms without insurance may have to divert cash away from revenue generating projects in order to make good the loss.** Although it would be difficult to analyse the macro economic effect of firms either requiring larger amounts of finance to maintain highly liquid contingency funds, these would not have the same beneficial effects on the economy as capital to finance investment, and the outcome would be a reduction in national income. Carter (1979, p39) comments that... (see quote overleaf).

28 There is substantial evidence that the form of an organisation affects the insurance cover its buys. Mayers and Smith (1990) found that the demand for insurance products by closely held corporations is higher than for widely held corporations

29 Mayers and Smith (1982) questioned why firms with diversified owners should buy insurance, and emphasised that shareholders who are not risk-averse have an interest in insuring against losses to avoid bankruptcy and similar costs

30 Although, executive rewards linked to stock options may have the opposite effect as the value of those options tends to increase as the volatility of firm performance increases. Research reported by Tufano (1996) indicated that firms whose executives received stock options were less likely to undertake risk-controlling activities. Chen et al (2001) found similar results in the US life insurance industry

31 That is, the holders of corporate debt

"Insurance enables firms to operate with at greater degree of security, and without the need to set aside capital in highly liquid contingency funds. Exactly what this means in terms of the stimulus given to technological progress, competition and improved use of capital funds, it is impossible to say... therefore unless very large contingency funds were established, which for many small firms would need to be far larger than their present capital employed, the population of firms would become less stable than it is with insurance. An increase in the number of bankruptcies would not be caused by any fall in business efficiency but would be the result of the random occurrence of large losses due to the operation of various perils."

3.2b Confidence in insurers' claims-paying ability

Consumer confidence in the insurance industry is key to its success. Without confidence in the ability of insurers to pay valid claims, the economic benefits of risk transfer would be undermined.

Long term damage to the industry's reputation can arise if insurers refuse to pay valid claims or become insolvent. Although evidence is comparatively rare, Doherty & Smith (1993) provide an account of how one large UK energy company withdrew from the insurance market in the early 1990s because of the difficulty in obtaining claims recoveries from insurers.

The experience of Independent, Chester Street and HIH are reminders that the solvency of insurance companies cannot be taken for granted. The UK Financial Services Authority has adopted a risk-based approach to insurance regulation[32], and companies will have to maintain capital resources that reflect the risks that they are running. The FSA has suggested that its new capital requirements are broadly consistent with a BBB rating, which is apparently equivalent to a risk of ruin of 0.5% over one year (Financial Services Authority, 2003).

The risk-based approach of both the European Union and the FSA is expected to provide improved protection for policyholders, but no system is completely secure. Insurers will also be required by the FSA to undertake Individual Capital Assessments, which reflect their own circumstances, so that companies should maintain capital relevant to their own circumstances rather than adopting a formulaic approach to capital resource requirements. However minimum capital requirements often have limited usefulness in preventing insolvency as no amount of capital is likely to be sufficient in the hands of incompetent management.

Insurance companies have also taken steps to reduce the likelihood of claim disputes (which delay the payment of valid claims) by making their policy wordings more transparent. There are also mechanisms in place to resolve disputes. The Financial Ombudsman's Service is able to adjudicate on complaints from individual policyholders, without any charge to the complainant.

32 The European Union Solvency II review is expected to lead to requirements along the lines of the measures the FSA is introducing

3.2c Wider economic effects of risk transfer

The risk transfer function also generates positive externalities for the economy, in terms of positive effects that are not captured by insurers themselves. By providing individuals and businesses with the means to ensure their security against financial loss, the insurance industry contributes to reducing the burden that would otherwise be placed on the state welfare system. In fact, in many areas, an active private insurance market can provide 'welfare benefits' which are more targeted at the needs of users, and which can be administered at lower cost, than those provided by the state itself.

3.3 The Role of Risk Pricing

3.3a Insurance premiums provide incentives to reduce risk

How an insurer sets their premiums provides important incentives for individuals and firms. Insurers set premium rates which reflect the expected loss, calculated either by direct computation based on a pool of similar risks or by linking premiums to previous claims experience.

If the premium reflects the risk associated with an insured individual or firm, it produces an incentive to reduce the risk as this will reduce the premium payable. Risk-taking individuals such as smokers and dangerous drivers place physical and human productive capital at risk. As the price of insurance rises, individuals face increased incentives to modify their behaviour, which provides beneficial effects for the economy as a whole. A recent report issued by the Department of Transport commended the role of risk-based pricing in incentivising safer driving:

"The [UK] insurance industry should continue to develop products which price young drivers into the market earlier, provide incentives to them to gain driving experience and see the benefits of that experience in terms of the premiums they pay." (Greenaway, 2004, para 4.11).

Accurate pricing of insurance premiums has the effect of making a market for risk. Firms can be expected to allocate their resources with reference to risk as reflected in insurance premiums. Accurate risk pricing enables firms and individuals to better make choices between risky activities[33]. In the case of compulsory insurance, risk-based pricing is the major mechanism for internalising the external costs of risk (the social costs of which would otherwise be borne by innocent third parties and state welfare programmes).

Concern has recently been expressed that premiums do not accurately reflect the risks for small firms buying employers' liability insurance. An enquiry by the Department of Work and Pensions (2003) heard complaints from businesses that the premiums they were being charged for employers' liability insurance did not take sufficient account of their good claims records[34]. At the present time, accurate risk-based prices are expensive to achieve and are only beneficial to customers if the cost of tailoring premiums is less than the economic benefits achieved. However as technology improves, the costs of tailoring premiums can be expected to fall. Indeed, in the example of employers' liability insurance, insurance companies have agreed to work with employers to increasingly tailor premiums to individual firms' risks.

The Association of British Insurers has also developed Making the Market Work – a scheme to assess the health and safety performance of trade associations. ABI provides summary reports of trade associations to its members who have undertaken to take this, and other positive risk factors, into account when underwriting.

3.3b Pricing and adverse selection

It is in the interests of insurers to set premiums that reflect risk in order to avoid adverse selection. Adverse selection occurs when buyers with high expected losses buy more insurance than those with low expected losses, when charged the same premium. In extreme circumstances, which are

33 Insurance which was too cheap in relation to the risk would then encourage excessive risk-taking

34 Less individually tailored premiums can have social consequences when there are insufficient incentives created for small firms to reduce the risk of injury, ill-health and death for their employees

more likely when demand is very price elastic, adverse selection problems can lead to the collapse of insurance markets. Clearly premiums which do not relate to the insured's risk provide very little incentive for risk reduction.

Of course, insurers can never have complete knowledge about the risk when setting premiums, but a wide variety of legal and procedural mechanisms have evolved to ameliorate adverse selection. These solutions obviously include the contractual requirement of utmost good faith (although this is diluted for personal lines business by FSA rules), the imposition of a degree of self-insurance on policyholders (restricting the opportunity for policyholders to over – or under-insure), and by designing incentive schemes for insureds to reveal their own risks.

In spite of the custom and practice employed to reduce adverse selection, empirical research continues to uncover evidence of it in insurance markets around the world. For example, studies of the workman's compensation insurance market in North American markets report consistently that an increase in coverage leads to a worsening of accident experience[35]. Chiappori (2000, p385) says that:

"the underlying intuition is that workers' compensation can be used as a substitute to unemployment insurance ... Whenever workers' compensation is more generous than unemployment insurance, there will be strong incentives to delay the return to the [labor] market."

The researchers comment that workers are much more likely to return to work (following a period in receipt of workman compensation benefits) when unemployment is low.

3.3c Pricing and moral hazard

The economic benefits of risk-related pricing can be undermined by policyholder moral hazard. Moral hazard refers to unobservable changes in the insured's behaviour after the purchase of insurance. There are two main types: ex-ante moral hazard arises when the incentives to reduce the occurrence of a loss are reduced, and ex-post occurs when the incentives to control the size of the loss are undermined because of the insurance.

Parsons (2003) argues that third-party liability insurance is susceptible to a wider variety of moral hazard problems than conventional first-party insurance. This arises because the coverage offered by third party liability policies is much wider than that extended under first-party contracts (for example, liability insurance covers non-economic losses such as pain and suffering, which may not be available under first party accident & health insurance). As well as policyholder (moral) hazard, liability insurance is also vulnerable to claimant hazard, where the existence of insurance encourages third parties to pursue claims[36]. Furthermore, jurisprudential hazard may occur when judges and lawmakers choose to extend the scope of liability laws or make higher awards because the defendant is insured (this is the so-called deep pocket argument)[37]. Finally 'underwriting hazard' relates to the behaviour of some insurers and underwriters who may be encouraged to lower standards as a result of the long-tailed nature of liability insurance risks (a form of insurer 'short-termism').

As with adverse selection, moral hazard is endemic to insurance but the markets have evolved practices to control the problem. These include contractual requirements to behave as if the risk were uninsured, warranties, the imposition of a degree of self-insurance, and monitoring of policyholder behaviour. Although evidence of moral hazard in insurance markets is extremely difficult to isolate in practice, Chiappori (2000) discusses several studies which claim to have identified such behaviour. For example, changes to the 'no fault' motor insurance scheme in Québec in the early 1990s provided strong incentives to increase loss prevention, and triggered a significant reduction in accident probabilities by changing the behaviour of insured motorists.

35 See Chiappori (2000) and Fortin & Lanoie (2000) for comprehensive reviews

36 And insurance companies do the same, via their subrogation recoveries: "for reasons that are obvious, insurers do not, as a rule, throw good money after bad by pursuing uninsured tortfeasors" (Parsons, 2003, p461)

37 In a recent paper, Winter (2004) demonstrates how this reverse causation (whereby the availability of insurance increases liability awards) can destabilize insurance markets

3.4 Insurance Supports Tort Liability Law-making

The tort system (which awards damages to those who are injured by another's negligence) could not operate effectively without a healthy liability insurance market.

In the absence of liability insurance, the courts would be limited in the amount of damages they could award by the extent of the tortfeasor's (the negligent party's) assets. Indeed any person or organisation engaged in hazardous activities would then operate deliberately with a minimal level assets (a situation termed 'judgment proof') in order to avoid paying damages to third parties. As a result, injured parties would be unable to obtain compensation (and would therefore have to turn to the welfare system), while the amounts that were awarded would depend on the wrongdoer's ability to pay rather than the nature of the injury suffered by the claimant. Furthermore, the incentive on wrongdoers to reduce risk would be considerably diluted. Instead, the efficient operation of liability insurance not only provides the resources to compensate injured parties and incentives to take care, but may also do so at a lower cost than a scheme based on welfare payments to injured third parties.

However, Parsons (2003) emphasises the strong inter-relationship that exists between liability insurance and tort law by arguing that the pattern of statutory liability, as well as court decisions, is determined by the practice of the local liability insurance markets and the availability of cover. In particular he says that:

"there is no doubt that the general availability, or otherwise, of insurance has played at least some part in shaping the (liability) law" (p465) and "statutory liability is often limited to a figure that reflects the availability of liability insurance cover" (p466).

Motor insurers play an additional role in supporting the tort system via the operation of the Motor Insurers' Bureau which provides compensation (funded by a levy on UK motor insurance companies) to people who are injured by uninsured or untraceable drivers. The industry has been commended in a recent report published by the Department of Transport which said:

"the [UK] insurance industry is clearly fulfilling its legal obligations, as well as acting responsibly in funding the MIB" (Greenaway, 2004, para 3.11).

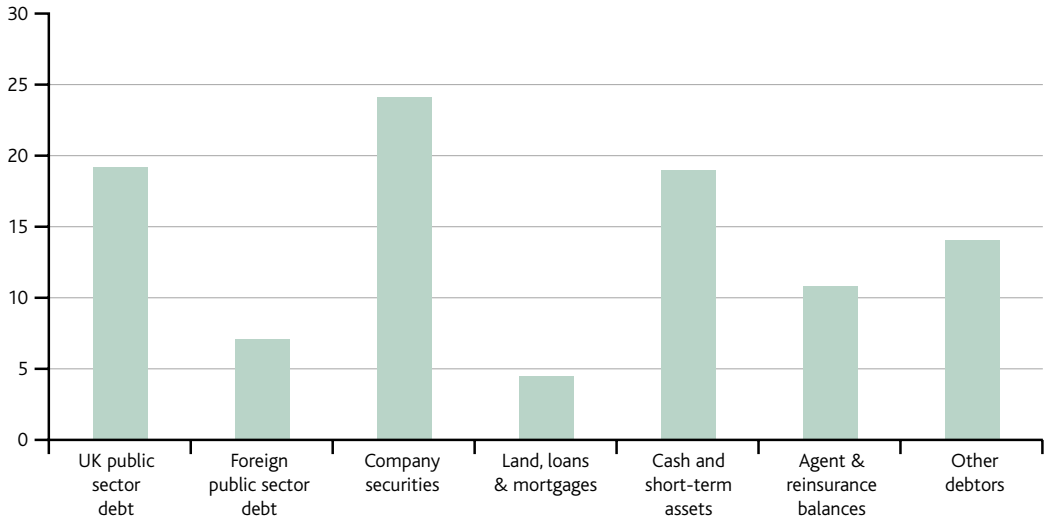
Of course, some have argued that the availability of liability insurance has fuelled a 'compensation culture' which has led to exaggerated liability claims and awards. It must be remembered however that liability insurance is the principal mechanism by which claimants are compensated, and potential injurers are incentivised to take care. In the absence of insurance, negligent tortfeasors would increasing rely on their limited liability to avoid paying compensation to injured third parties.

3.5 The Investment Function of Insurers

Insurers receive premiums in advance of paying claims, so they can build up a stock of assets. By investing these productively, insurers are able to earn a rate of return that enables them to charge lower premium rates. At the end of the year 2003, UK general insurance companies had total assets of £107 billion. A breakdown of the way these were invested is provided in the chart below.

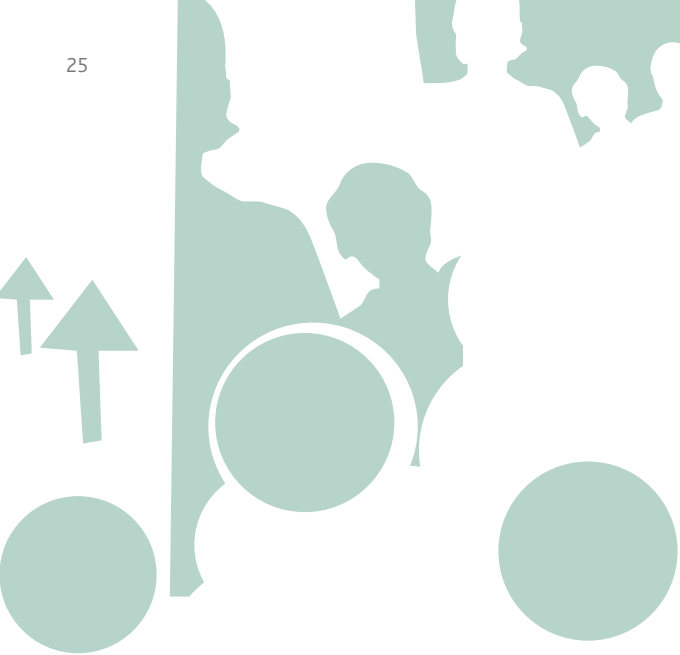
Insurance companies are major institutional investors in their own right (although this investment function is clearly greater in the case of long-term rather than general insurers), and play a key role in supplying long-term capital for government and industry. Insurance companies contribute substantially to the economy by contributing to the primary and secondary equity markets, by holding corporate bonds, and by investing directly in property.

% Breakdown of Total Assets of UK General Insurance Companies, 2002



Insurers enhance the efficiency of the financial system in three main ways:

1. As financial intermediaries, they reduce the transaction costs of bringing together savers and borrowers.
2. They create liquidity through use of premium income to provide long term capital.
3. Insurers facilitate economies of scale in investment. By amassing large sums from thousands of policyholders, insurers can often meet the financing needs of large projects, thereby enlarging the set of feasible investment projects and encouraging economic efficiency.



The greater the variety of financial intermediaries, the more efficient the system and the greater its contribution to economic development. The insurance industry as a financial intermediary provides significant benefits for the accumulation of productive capital within the economy. Financial intermediation services enable investors to access diversified investment portfolios, which facilitates their willingness to invest in high-productivity projects. Liquidity aids economic growth by facilitating a smooth flow of funds to more profitable projects.

Finally, insurance companies as institutional investors enhance the efficiency of capital markets through their active participation in corporate governance. Insurers gather substantial information to conduct their evaluation of firms, projects and managers in deciding whether, and at what price, to issue insurance and in their roles as the lenders and investors. Insurance companies can undertake this information-gathering process effectively, and are better at allocating capital. Because insurers have a continuing interest in the firms to whom they provide financial capital or insure, they can monitor firms to reduce the chances that they will engage in unacceptable risk-increasing behaviour. Insurers can thereby encourage firms to act in the best interests of their various stakeholders.

3.6 The Insurers' Role in Providing Risk Management Advice

Insurers provide risk management activities in both the private and public sectors.

Many commercial insurance contracts involve the provision of risk management services. The insurer is likely to undertake an assessment of the loss potential, as part of the underwriting process, and to offer risk management advice. This is a particular feature of so-called 'highly protected risks' insurance. Insurers support many loss-control programmes, typical of which are fire prevention, occupational health and safety, industrial loss prevention, reduction in car damage, theft and injury, and so on. These reduce both direct and indirect losses to businesses and individuals. Firms that try to self-insure may not have the necessary specialised knowledge to reduce these losses. Indeed, because insurance companies bare some, if not all, of the risk they have a strong incentive to reduce loss costs.

Insurance surveyors make recommendations for risk reduction as part of the contract renewal process, which are in the interests of businesses to adopt in order to reduce premiums. At the claim stage, insurance representatives and loss adjusters can help reduce losses through advice on salvage operations.

Insurers also undertake or sponsor research focussed on reducing risk. For example, the motor repair research centre at Thatcham studies methods of reducing the cost of car repairs and makes recommendations to motor manufacturers to improve safety.

Insurers also advise on reducing risk from a public or societal perspective. This may arise by lending support to national health and public safety programmes, or by applying pressure on government to invest more on risk reduction at a national level. Although there are numerous examples highlighted by the Association of British Insurers, perhaps the most recent high-profile initiative is the lead taken by the insurance industry to encourage the strengthening of national flood defences, for more details see Milne (2002).

4. INSURANCE OUTPUT

4.1 Introduction

We now turn to discuss how the value of insurance industry can be measured in practice. Firstly we consider how to measure insurance through the National Income accounts, which measure the output of the insurance industry as the demand for insurance, in terms of the cost of the resources needed to supply it. Those resources are, in economic terms, the 'factor inputs' of capital and labour, together with the other goods and services purchased by insurers.

However, differing views have been put forward by economists and national income specialists as to how best measure insurance output. A particular problem is that output can be negative in those measures where claims are deducted from premiums. For a full discussion of the merits of different methodologies see separate Appendix 3.

4.2 Measuring output

The principle adopted in the UK national income accounts[38] is that the value of the output of the insurance industry is what policyholders pay for the pooling, risk-bearing, investment and risk management services they receive from insurers. As described above, this payment is based on the premiums paid to insurers ('P') less any claims received ('C') plus the interest income that the insurer has accumulated ('I'). The claims payments refer to the ex post value of claims, rather than anticipated ex ante claims.

The measurement of aggregate output based on P+I-C recognizes that the payment of premiums and the receipt of claims is essentially a redistribution between the insurance industry and its policyholders: policyholders pay for the organization of this redistribution service[39]. The payment for this redistribution is then the excess of premiums over claims, and investment income on technical reserves is then added back to allow for the fact that premiums are discounted (and are therefore lower because of it)[40].

Therefore, in the national income accounts, the output of the industry is calculated as:

	Earned Premiums;
plus	Investment Income attributable to the technical reserves;
minus	Incurred Claims.

38 And indeed, in the framework for national income accounting issued by the United Nations SNA1993, and also in the corresponding system adopted in Europe, ESA1995

39 This is analogous to alternative (i) in Table 1.1

40 Another perspective is that this represents the investment income that the policyholders sacrificed by paying their money to the insurer rather than investing it themselves

4.3 Output of the UK Insurance Industry in 2003

On a P+I-C basis, working from the national accounts (for detail see separate Appendix 2) the aggregate output of the UK insurance industry in 2003 was £18.374 billion.

4.4 Value Added by the UK Insurance Industry in 2003

The output of the insurance industry reflects what policyholders forgo, by paying higher premiums than they receive back in claims (accumulated with interest). This output can be divided between the following items, reflecting the payments to the various parties involved:

Table 1: Analysis of output

	Element of output	Reward to
Insurer's expenses	Wages and other compensation payments to the insurer's employees	Employees
	Other expenses of the insurer: termed 'intermediate inputs', being purchases of goods and services, including reinsurance, commission, computer services etc	Suppliers
Insurer's profits		Shareholders

One interpretation of this is to say that the output of the insurer (which is a monetary amount) is its 'revenue'. From this revenue, we subtract expenses, and the residual is profit. Now if we added up the output of every firm in the economy, the figure would not equal the national output (gross domestic product). This is because we would have double-counted intermediate inputs such as computer services: these are included in the output of both the computer supplier and the insurer. In order to measure the contribution of the industry to GDP it is necessary to deduct the value of these intermediate inputs to get value added: thus value added is the value of a firm's (or industry's) output minus its intermediate inputs. Value added can then be aggregated throughout the economy to get gross domestic product. In such an analysis the value of the computer services inputs purchased by the insurance industry is part of the value added of the computer industry, and not of the insurance industry.

Then we can see that the insurance industry's value added equals the sum of the wages (and other compensation payments) to its employees plus insurers' profits. In other words, it is the sum of the rewards to the factors of production (labour and capital) supplied by the insurer[41].

The UK insurance industry had a gross[42] value added at basic prices of £2.905 billion in 2003. The UK economy as a whole was £976,148 billion, so that the insurance share of UK GDP was 0.298%.

41 In some formulations, rent is shown separately as the reward to "land" as a factor of production
42 Gross value added is the value added before any deductions for depreciation of fixed assets

4.5 Trends over 1987 to 2003

Figures 1 and 2 illustrate the trends over 1987-2003 in insurance output and the industry's value added. Clearly the output and value added of the industry are affected by the underwriting cycle, and the excess of premiums plus investment income over claims (P + I – C) varies sharply over the cycle. The ex post nature of the calculation mean that insurance output can be volatile, and affected by unpredictable fluctuations in both claims and investment income.

Figure 1: Output of UK Non-Life Insurance Companies, 1987-2003

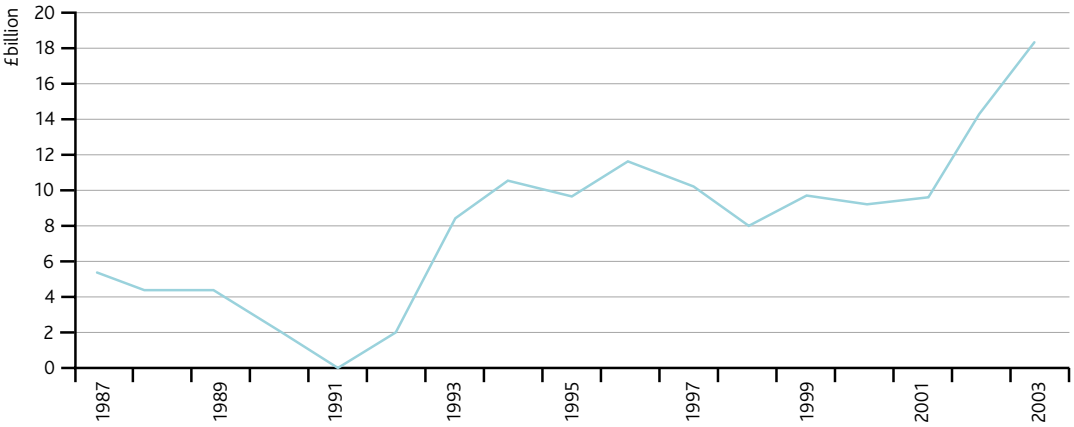
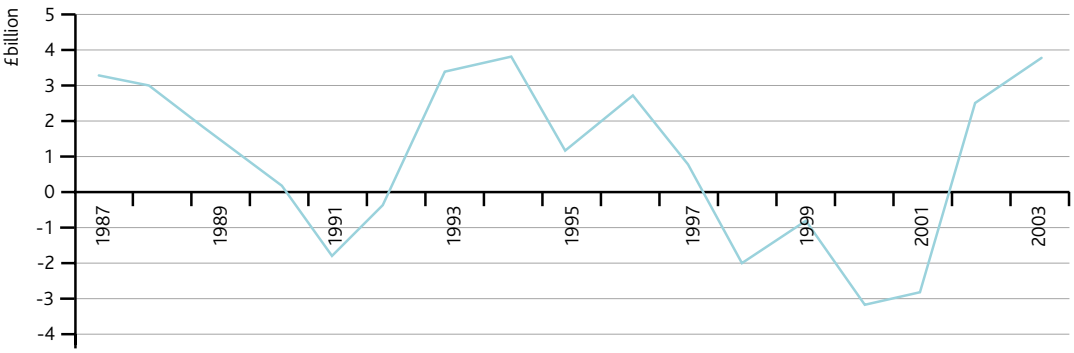


Figure 2: The Value Added of UK Non-Life Insurance Companies



We note that value added has been negative in several years, and this is true of output in certain years too. Of course, what we have is an ex post measure, where in a year of large claims, it appears that output is very low (or negative). One way of interpreting this is to say that policyholders had exceptionally good value for money: premiums were low in relation to the claims that were incurred. Clearly though, consumers make no assumption that they will receive a return (in the form of a claim) in any given year, suggesting that comparing the value of premiums and claims in any given year will not be a particularly enlightening measure of output. However the possibility of negative output (which would be impossible in most other industries) has led many experts to the question the value of the (P+I-C) approach; after all policyholders continue to benefit from the insurance service even in years of negative output.

Figure 3: Non-Life Value Added as % Total UK, 1987-2003

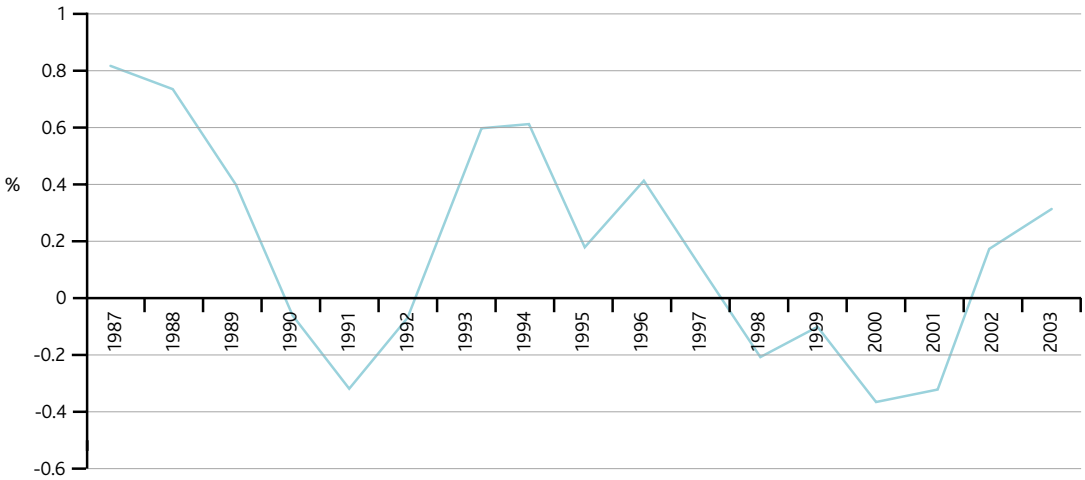


Figure 3 shows the trend in the share of insurance in national value added. This proportion is volatile, and averages 0.12% over the period 1987-2003.

5. INSURANCE INTERACTIONS WITH OTHER SECTORS OF THE ECONOMY

5.1 Supply and Use Tables

Supply and use tables (SUT) are an important part of the UK national accounts, and show the quantities in which different products are supplied – through production and imports, and used – by consumers, the government, industries and for exports. They can allow us to separate out final demand for insurance between the direct output of the industry, indirect output (through the insurance industries role in facilitating other economic activities) and the amount of final demand made up of imports.

We have also used these tables in the following section to model the impact of exogenous changes in demand and the level of taxation on the value added of the insurance industry and overall UK economic output. This informs our understanding of the current interactions between the insurance industry and other sectors of the economy.

The Office for National Statistics publishes the supply and use tables with the same level of industry and product detail for each year from 1992 to 2002 (ONS 2004b). In these tables, insurance (both long-term or life and general insurance) is included in a sector termed 'insurance and pension funds' (IPF). The insurance industry makes up a large proportion of this combined sector (for more detail on the SUT data see separate Appendix 4).

5.2 The direct and indirect value creation attributable to insurance

Measures of direct value added are narrowly defined in the SUTs. The non-life insurance industry is made up of those firms that primarily produce general insurance. But they may also produce other services; the ONS data indicates that insurers receive revenue for rental services and income that is not classified as being from insurance. Firms can produce both output of their own industries' product and of other industries, although only the insurance industry can produce the insurance product. Therefore, there is a definitional difference between measuring the value created in a certain industry that may produce a number of different products and the value created to produce a certain product.

Direct measures of value creation within an industry are further complicated by the contracting out of services that could, or have previously, been produced within an industry. An extreme example of this is the railway industry between 1992 and 1997, a period which saw a 35% fall in value added while output grew by 36% (ONS, 2004b). During this period inputs of machinery rental services used by the railway industry increased from 0% to 10% of output as machinery that had previously been owned by railway companies, was sold and rented back. Simply contracting out services that were previously performed in house does not affect the

total value added in the economy, but does affect individual industries' measures of value added.

In order to resolve this problem, it is useful to consider the value added by companies in all industries that produce products that are in some way used in supply chains. This method would count the value added in the machinery rental companies as providing services that feed into the supply of railway services. This output would then be included in the calculation of value added for the railway services product.

In the context of insurance, it is important to include the value created in companies that provide goods and services to the insurance industry, for example insurance broking, IT services or telecommunications.

The story does not end there. An IT company that is providing services to the insurance industry may also be purchasing inputs of goods and services, some of which could be provided in-house. They might use an external personnel recruitment firm. The measurement of value added that is created to provide insurance services should include the value added created in personnel recruitment firms that provides services to the computer service industry that is used to provide services to the insurance industry. The chain of supply does not end there however, as the personnel recruitment firm will also purchase products from other firms, and there is value added created there. There are potentially an infinite number of steps in the supply chain, but because the proportion of value added to output in each industry must be less than 100%, the values that can be attributed to the insurance product output become successively smaller.

Insurance is itself used as an input into the production processes of other industries, and therefore it can enter into its own supply chain, and it is also used in the supply chain of other products. When the value added for an industry is compared with the value added created to supply a product, the product measure can be larger or smaller than the industry measure, as the product measure only counts value added that is created to satisfy final demand. Final demand for a product is all the spending on a product that does not enter into a supply chain for another product as an intermediate input. Types of final demand include private consumption, government consumption, investment and export demand.

Input-output analysis can be used to show the value added created by a given level of final demand spending. This technique has been used extensively in many areas of economics since the 1930s when Vassily Leontief, the Nobel prize-winning economist, developed the technique. The technique enables calculations to be made of the level of value added creation attributable to a given level of final demand (for a full explanation of the technique see separate Appendix 4).

The values for final demand for general insurance are shown in Table 1. In 2003, final demand for general insurance was £14,076 million. Input-output analysis shows how much income was generated by this £14,076m of spending. The remaining £4,298 million of insurance output that was purchased by other industries (intermediate demand) is considered to be driven by the final demand for other products.

Table 1: Sources of Final Demand for General Insurance, 2001-2003, £ million

	2001	2002	2003
Local government	113	214	275
Private households	4,897	9,325	11,981
NPISH	75	143	185
Exports	2,568	1,272	1,635
Total Final Demand	7,653	10,954	14,076
Intermediate Demand	1,756	3,345	4,298
Total Demand (P+I-C)	9,409	14,299	18,374

Source: ONS (2004a)

Input-output multipliers for the UK economy, derived from the latest version of UK input-output tables, and taken from the insurance and pension funds industry, have been applied to these final demand figures. The results are shown in Table 2.

The direct value creation, or GDP contribution, of insurance in 2003 was £5.0 billion, or 0.46% of GDP. This figure is necessarily lower than the total final demand for insurance in this year as it counts only the GDP created within the insurance industry in producing final demand services. Notably, the direct value creation is slightly lower than the GDP contribution of the insurance industry itself, as the input-output measure does not include value added generated in the provision of products that are used in other industries to satisfy the final demands of consumers for other products.

The direct plus indirect value creation of insurance was £12.8 billion, or 1.17% of GDP in 2003. This is the complete generation of value added that is created by all industries in providing products that ultimately go into the production of insurance that is consumed by final consumers. It is notably higher than the GDP contribution of the insurance sector itself, but smaller than total final demand for insurance as a part of final demand is ultimately provided by imported goods and services (at some point in the chain of production that leads to the provision of final insurance services). This import leakage prevents the direct plus indirect GDP contribution from equalling the total final demand figure. The figures for the direct and indirect value created by final demand for general insurance are a more accurate reflection of all the earnings generated from insurance expenditure than the gross value added figures for the general insurance industry.

Table 2: The Direct and Indirect Value Created by Final Demand for General Insurance, 2001-2003, £ million and % of GDP

	2001	2002	2003
Final Demand (£ million)	7,653	10,954	14,076
Direct Value Creation (£ million)	2,732	3,910	5,025
Direct plus Indirect Value Creation (£ million)	6,986	9,999	12,849
Direct Value Creation as a percent of GDP	0.2748%	0.3745%	0.4568%
Direct plus Indirect Value Creation as a percent of GDP	0.7026%	0.9576%	1.1682%

6. AN ECONOMY-WIDE MODEL APPLIED TO INSURANCE

6.1 Economy-wide Modelling

The impact of insurance industry on the wider economy goes beyond that discussed in the previous input-output analysis.

The insurance industry also has impacts on other parts of the economy through prices and wages. The only way to show the impact that the insurance industry has throughout the whole economy is by economy-wide modelling.

Computable general equilibrium (CGE) modelling is a form of economy-wide modelling that takes both quantity and price effects into account. It models each industry and product of the economy separately, with equilibrium relationships existing for each, supply is always assumed to equal demand with prices adjusting to ensure that this is so, economy-wide totals add up correctly e.g. household income must equal expenditure. CGE modelling has a been applied to many areas of economic analysis – a succinct guide to this modelling approach is contained in Greenaway et al. (1994).

Economy-wide modelling of this type has not previously been applied to the insurance industry, although it has been applied in many other sectors of the economy where interactions between industries have been of particular concern. As part of this project a CGE model has been developed to analyse the insurance industry and its wider impact on the economy.

Figure 1 shows the circular flow of income in an economy. Income flows from industries to factor markets (capital and labour) in the form of payments for employment and returns on capital. This income flows to institutions – households, firms (retained profits) and the government (publicly owned companies and assets) – which spend their income on products, which in turn lead to a flow of income back to industries. Apart from the circular flow itself, there are a number of points at which smaller levels of income flow from industries to product markets, as industries demand intermediate inputs (i.e. they use the output from other industries); from industries to the government (taxes on production) and from product markets to the government (taxes on products). Flows to and from the rest of the world also occur through exports, imports and savings and transfer flows.

The income flows represented in Figure 1 are modelled in CGE models not as single flows but as multiple flows between more than one industry, more than one factor, more than one institution and more than one product. This gives CGE models a high degree of complexity as they account for each industry's use of every product, and of every factor of production; and each institution's consumption of each product.

This framework allows for a large number of interactions within the economy to be modelled. Feedbacks between industries can occur through:

- intermediate demand and from there through the product markets;
- factor markets where an industry that employs a large quantity of one factor, such as labour or capital, must compete against the other employers of that factor for the ability to hire the factor; and
- institutions' demand where one industry may produce a product that is a close substitute for another industries' main product.

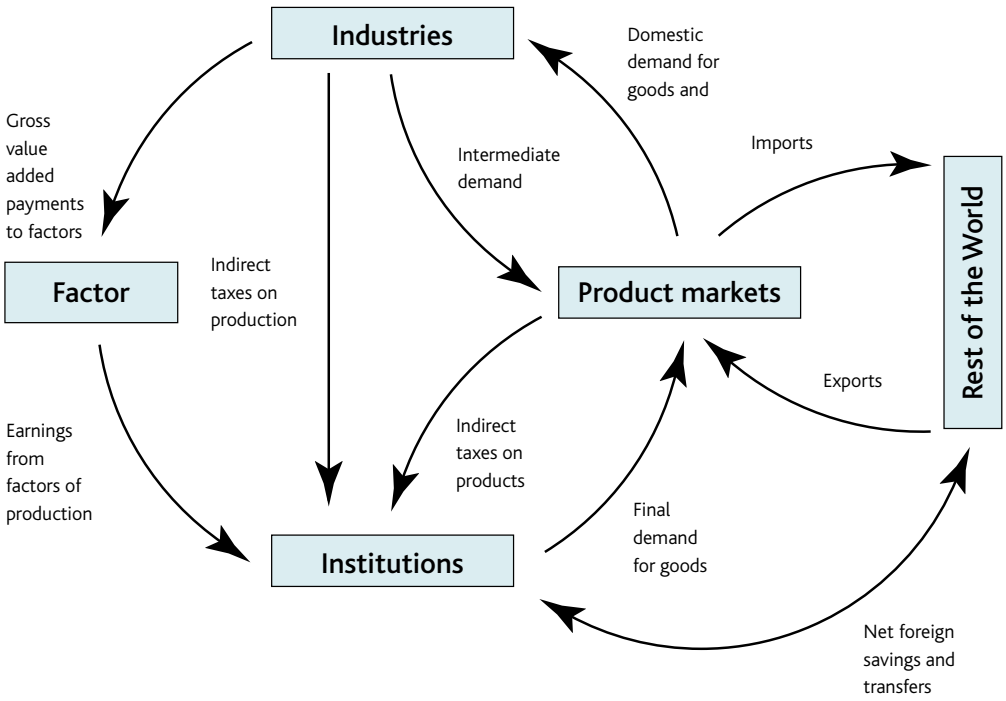
Interdependencies between industries through intermediate demand are accounted for in input-output (I-O) modelling, but as can be seen here, there are other interdependencies that input-output models miss because the feedback mechanism works through prices, and I-O models do not include prices or account for how industries and institutions react to changes in prices.

The key distinguishing feature of CGE models is that, within this economy-wide multi-market framework, behavioural equations are specified that determine how industries and institutions react to price changes. Industries' production functions are specified, and under the various market conditions (such as perfect competition, monopoly, or monopolistic competition) that prevail in that market, the functions that specify how industries respond to price changes are derived. Institutions' demand functions are specified, and these functions specify how they respond to price changes.

Relationships through prices are equally important, sometimes more so, than the more readily represented relationships of an I-O model, and a CGE model is able by specifying price relationships to incorporate these more complex feedback effects.

The insurance industry employs factors of production such as labour and capital much like other industries in the economy. What makes the insurance industry different from other sectors is the high importance of financial capital to the industry itself, and the particular attributes of the insurance product such as risk pooling, risk transfer and the intermediation role that insurers provide.

Figure 1: The Circular Flow of Income in an Economy



6.2 Illustration of the Effect of an Increase in the Demand for Non-life Insurance

In order to illustrate the role of insurance in such a model, suppose there was an external exogenous factor that led to an expansion of the insurance industry. This expansion would have direct economic impacts, such as an increase in financial capital required to cover the risk of additional insurance policies. The impact would be felt through:

(i) increased intermediate demand by the insurance industry for the products it used, leading to increases in output in sectors that produce those goods (which would have follow on effects through the rest of the economy);

(ii) increases in employment of the factors of production used by the insurance industry, through labour markets and capital markets;

(iii) increases in wage rates charged by factors of production, which would necessitate reductions in employment of those factors elsewhere, and possibly an increased use of imported factors; and

(iv) increases in prices of products used by the insurance industry.

The wage and price increases would affect many sectors of the economy, but would also increase the costs of the insurance industry, which could only be passed on in the form of higher prices. This would 'crowd-out' a proportion of the initial increase in insurance industry output, as demand for insurance would fall to some extent because of the higher prices.

An increase in the size of the insurance industry would necessitate increased volumes of financial capital to be held to cover the industry's contingencies. This would have significant effects on capital markets, and other industries that are particularly dependent on capital would have to pay a higher price for the use of capital – they would have to offer higher rates of return. The largest effects on other industries might therefore be felt in capital-intensive industries, as well as industries that are more intensive purchasers of insurance.

A description of the model used for this project is given in separate Appendix 5.

Imagine an increase in households' demands for general insurance of 10%; this is equal to £1,444 million in 2002. This increase could be interpreted as if the insurance industry were able to offer a new form of insurance, or if changes in households' risk aversion led to their demanding more insurance. It should be noted that this is the long-term effect on output measured in terms of premiums plus investment income minus claims, with the ratios of these three components being fixed.

Long-term effects are modelled, so claims and investment income also increase by 10% as well as premiums. Households must reduce their expenditure on other items, initially by the same amount as they increase their spending on general insurance, although earnings and price effects then modify their spending levels and patterns. There is no attempt to measure an increase in risk itself, which would have different ramifications on consumer demand, or of any increase in claims (due, for instance to increased incidence of natural disasters) that would lead to an increased perception of risk.

Results can be interpreted in two ways: the effects of the 10% increase in demand, or the effect (in pounds) for each pound of stimulated demand. This second way of interpreting the demand increase leads to a 'multiplier' value. Results for this simulation are presented in Table A5.1 to Table A5.5 in separate Appendix 5 and in Table 1 below. The first three of these tables examine products in the model, where life insurance and general insurance are separately identified; the last two of these tables examine life and general insurance together.

The increase in general insurance demand has a small but positive effect on GDP, which increases by £114 million, or 0.011%. This increase in GDP is partly due to an overall decrease in imports, by £60 million, as the increased demand for insurance leads to fewer imports than the previous patterns of expenditure that have been replaced by this demand. As a result of the increase in demand, the insurance industry's output increases by £961 million, or 3.2%.

The complete change in industry structure and the structure of employment, physical and financial capital usage results in an increase in the rate of return for capital of 0.027% and a change in the wage rate of labour of -0.016%. Returns on capital, wage rates, and all other prices in the model, are relative to the consumer price index. The change in the structure of employment therefore leads to a larger increase in demand for capital than it does for labour. Insurance itself is highly intensive in its use of financial capital, which along with increases in demand from other sectors leads to a higher return to capital in the new equilibrium.

Table 1: Total Market Changes

	Total change in demand £ million, real units	Price % change	Revenue £ million, real values	Demand multiplier £/£	Revenue Multiplier £/£
Finance	-104	0.10	-21	-0.072	-0.015
Life insurance	4	-0.09	-10	0.003	-0.007
General insurance	936	1.40	1,119	0.648	0.775

Source: Table A5.1

Table 5.1 shows that general insurance demand increases by £936 million (less than the £1,444m due to the impact of higher prices on the equilibrium level of demand) and life insurance demand increases by £4 million. Demand for most other products falls by small values, with only two other products – business services (£82 million) and transport services (£1 million) having an increase in demand (see Table A5.1 in separate Appendix 5). These patterns of increases and falls are determined by many factors, the most significant being:

(i) how products are linked to the insurance industry through intermediate demand – demand for business and transport services increases largely because of this;

(ii) whether industries producing these products rely on the same types of inputs as the insurance sector – finance also relies heavily on financial capital; and

(iii) how products are linked in demand – the increase in capital costs pushes up finance costs and therefore prices, which increases the demand for life insurance as these products are substitutes.

The second column in Table 1 above shows the increases in prices as a result of the change in general insurance demand, where all prices are shown relative to the consumer price index, so there must necessarily be prices that increase and other prices that fall. General insurance (1.40%) is the product that has the largest price increase. The third column shows changes in revenue, which is directly related to the previous two columns.

The fourth and fifth columns of Table 1 show changes in demand and revenue as a proportion of the initial size of the increase in general insurance demand (a 'multiplier'). Here it can be seen, for example, that general insurance demand increases by £0.648 for every pound of initial increase; almost half the increase is crowded-out through higher prices as the increased demand pushes up prices and reduces demand for previously purchased insurance. In revenue terms (column 5) there is a £0.775 increase for every pound of initial increase.

Table 2: Changes in Demand

	Private Consumption £ million, real units	Government Consumption £ million, real units	NPISH Consumption £ million, real units	Other Demand £ million, real units	Total Demand £ million, real units
Finance	10	0	0	-114	-104
Life insurance	4	0	0	0	4
General insurance	1,127	-6	-4	-181	936

Source: Table A5.2

Table 3: Sectoral Indicators, values and multipliers

	Output £ million, real units	Revenue £ million, real units	Net Value Added £ million, real units	Employment £ million, real units	Capital £ million, real units
Finance	-177	-71	-84	2	-86
Multiplier	-0.123	-0.049	-0.058	0.001	-0.060
Insurance	961	1,118	246	56	190
Multiplier	0.666	0.774	0.170	0.039	0.132

Source: Tables A5.4 and A5.5

Table 2 shows that the crowding-out effect of higher general insurance prices relates not only to other products but also to other consumers of that product. While private consumption of general insurance increases by £1,127 million because of the increase in demand, consumption of general insurance by other consumers falls (e.g. the government). Total demand for general insurance increases therefore by the smaller figure of £936 million. The relevant multiplier for private consumption is 0.780 compared to the multiplier for total demand of 0.648.

Table 3 shows that the increased demand for general insurance increases the output of the insurance industry by £961 million, gaining additional revenue of £1,118 million – note that the price of general insurance has risen. Net value added (not including taxation revenues) increases by £246 million in the insurance sector, with an addition to employment of £56 million and to capital use of £190 million. In multiplier terms, every £1 of additional demand for general insurance raises the output of the insurance industry by £0.666 and leads to additional net value added in this industry of £0.170. Note that the additional net value added of £246 million compares with the increase in GDP of £114 million, indicating that there are other sectors where value added falls. Finance is the industry where value added falls by the most, by £84 million; details of other industries are contained in separate Appendix 5, Table A5.4. The increase in insurance demand also increases the output of business services (£17 million), the output of which is used in the insurance industry.

Overall, this example demonstrates how increased demand for insurance would have a positive impact on value added in the UK economy, before considering any knock-on effects that new insurance products might have on the productive use of capital within the economy.

6.3 An illustration of the impact of changes in the insurance premium tax

One of the advantages of CGE modelling is the ability to model changes in tax rates, and to show the effects that such a change has on the product and industry to which the tax is directly applied, as well as to other products and industries and to the economy as a whole.

A 100% increase in the Insurance Premium Tax is introduced in the model, i.e. a change from a rate of 5% to 10%. The revenue raised by such an increase, at the original (2002) levels of output and premiums is £2,138 million. This increase would reduce GDP by £476 million (0.05%), and lead to changes in labour wages of -0.2% and capital returns of -0.3%. This shows that real (relative to consumer prices) pre-tax earnings would fall. Income tax rates would also fall offsetting the increase in government revenue from the increased tax rate and households would be left worse off.

Table 4: Total Market Changes

	Total change in demand £ million, real units	Price % change	Revenue £ million, real values	Demand multiplier £/£	Revenue Multiplier £/£
Finance	1,013	-0.07	888	0.474	0.415
Life insurance	-55	0.30	-10	-0.026	-0.005
General insurance	-2,667	-4.50	-3,091	-1.247	-1.446

Source: Table A5.6

Table 4 shows that general insurance would be the product most affected by the increase in insurance premium tax, with (pre-tax) prices falling by 4.5%, demand falling by £2.7 billion and revenue falling by £3.1 billion. Per unit of the initial revenue effect (£2,138 million), demand falls by 1.247, and revenue falls by 1.446. Note that demand and revenue fall by more than the initial tax increase because

(i) demand falls initially by the extent of the tax increase, and

(ii) higher prices borne by the consumer further reduce demand.

Tables A5.6 and A5.7 in separate Appendix 5 show details of how demand changes occur in for other products, and A5.8 the multiplier effects on all products.

Table 5: Sectoral Indicators, values and multipliers

	Output £ million, real units	Revenue £ million, real units	Net Value Added £ million, real units	Employment £ million, real units	Capital £ million, real units
Finance	983	885	472	87	385
Multiplier	0.460	0.414	0.221	0.041	0.180
Insurance	-2,831	-3,182	-700	-163	-537
Multiplier	-1.324	-1.488	-0.327	-0.076	-0.251

Source: Tables A5.9 and A5.10

Table 5.5 shows that the insurance industry would lose more from the tax increase than any other industry, with output falling by £2.831 billion, revenue falling by £3.182 billion, net value added falling by £700 million. Of the £700 million in value added, £163 million would be through a fall in labour employment and £537 million would be through a fall in the use of physical and financial capital. The fall in value added in the insurance sector of £700 million is comparable with the fall in GDP of £476 million; the difference in these two figures indicates the extent to which economic activity in other industries increases, such as in finance, where an increase in net value added of £472 million is stimulated.

Outside the insurance sector, there would be smaller gains in many other industries as expenditure is switched away from insurance to other products, most notably to finance, and as labour and capital previously used in the insurance sector would move out of the sector to other sectors, at a lower wage rate than in the pre-tax increase situation. In some sectors, however, the insurance premium tax increase would lead to reductions in output and value added; business services and construction would incur the larger falls in output in this way as they are the sectors most closely linked with the supply chain of the insurance industry. Tables A5.9 and A5.10 in separate Appendix 5 show the details of each sector.

In this section the model has demonstrated that an increase in Insurance Premium Tax would (without offsetting tax decreases elsewhere) have a negative impact on overall UK GDP.

7. CONCLUSION

This report has examined the contribution of general insurance to the UK economy by looking at a combination of qualitative and quantitative approaches.

Insurance offers important economic benefits where activities are seen as risky and a mechanism is needed to manage risk. Almost all economic activity has some element of risk. We have different ways of coping with and managing risk, but with larger risks, insurance provides the risk pooling and risk transfer that we fall back on.

The report includes a number of measures of the insurance industry. However, financial measures of the direct contribution of insurance to the economy provide little indication of the real value of general insurance. The true significance of the insurance industry lies in the fact that if it didn't exist a large proportion of the rest of the economy would not exist either. Without a reliable mechanism for pooling and transferring risk, much economic activity simply would not take place.

To put it another way, insurance inescapably supports the rest of the economy. It provides the vital underpinning for stability and confidence in economic and social interaction.

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