1/2008

Topics

Climate change and liability
Contingent business interruption losses
Healthcare market

Münchener Rück
Munich Re Group

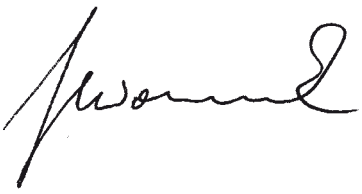
More than just a risk carrier

Dealing with risk professionally involves much more than the provision of capacity. Key to the process are extensive technical know-how and a deep-rooted knowledge of different countries' legal systems and structural features.

For example, technical innovations have revolutionised the value chain in the automotive industry, whose production process is being divided up and networked more and more globally. Today, a business interruption can therefore cause considerable losses far from where it happens. The insurance industry has to constantly analyse and evaluate this process of change, especially with regard to the contingent business interruption losses covered. With this in mind, our experts have done on-the-spot surveys of various major European car manufacturers and suppliers. Their new findings on risk management, contingency planning and loss potentials can be seen on page 16 ff.

Climate change and its consequences have led to heated discussions in the media over the last few years. In the USA, the debate over the consequences of global warming is increasingly taking place in the courtroom. Climate change and its effects for mankind, the environment and material assets have long been a strategic topic at Munich Re. In the section beginning on page 24, we take an in-depth look at possible liability claims related to climate change and present our views and position on this topic.

The fundamental structural change in healthcare markets is the focus of the third section in this issue of Topics. Although there is broad agreement that health services must remain accessible and affordable, this task is demanding far more of the insurance industry than was originally thought. After all, the healthcare market in particular is one area where our role goes far beyond that of a mere risk carrier. You can read about the challenges and solutions in healthcare from page 26 onwards.

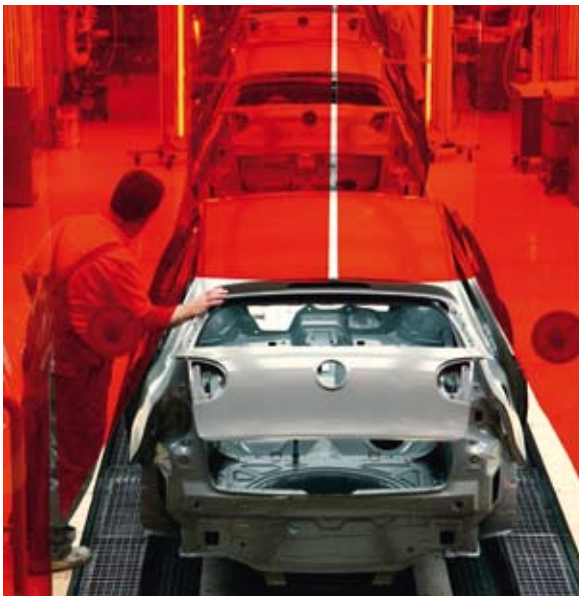


Dr. Torsten Jeworrek
Member of the Board of Management
and Chairman of the Reinsurance Committee

Car factory in Detroit: The state of Michigan continues to be the centre of the US automobile industry.

Climate change and liability

Climate change is fast becoming one of the main issues of concern for the public. It is also taking on ever greater significance for liability insurance.



Contingent business interruption losses

Very few sectors are as international or involve such a diverse range of highly specialised disciplines as today's automotive industry, which is constantly evolving at high speed.

Not everything grinds to a halt
The latest insights on risk management, contingency planning and loss potentials
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Accumulation under control
Why the oil and gas and pharmaceutical industries are less susceptible to accumulation losses
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The challenges of new manufacturing techniques
An analysis of the semiconductor industry
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Healthcare market

Technological advances make it possible to develop new methods of treatment. But this is by no means the only reason for the cost explosion in healthcare.

Managing market participants intelligently
Solutions and new products in healthcare
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Partners in risk
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Climate change and liability

In the USA, the debate over climate change is increasingly being held in the courtroom, with a growing number of claims for damages by US states and cities, environmental associations and private persons against energy companies, car makers and authorities. And although courts have thus far offered little encouragement to the plaintiffs in these cases, climate change is nevertheless becoming an increasingly important topic for liability insurance.

Storm chasers in Kansas: More and more adventure-seekers and amateur photographers risk life and limb in their search for spectacular photos.

Everything you need to know about climate change and liability

Climate change is increasingly becoming an issue of major concern for the public, as the growing weight of evidence strongly suggests that the rise in global temperature is substantially attributable to anthropogenic greenhouse gases. We have even started to see the first climate change lawsuits, primarily in the USA, which now makes it a topic of relevance for liability insurance in addition to the more obvious property exposure. In this article, Munich Re examines the main climate change and liability issues.

Prof. Dr. Ina Ebert/Dr. Guido Funke

What sort of lawsuits are there?

There are essentially three types of lawsuit: Firstly, actions against **authorities** accused of not making adequate use of the powers given to them by the legislature to control greenhouse gas emissions. The most prominent example of this is the case Massachusetts vs. EPA (Environmental Protection Agency), which the US Supreme Court decided on in 2007.

Secondly, there are lawsuits against **private companies** which seek injunctive relief against emissions or generally try to prevent activities that would cause more emissions (e.g. Connecticut vs. American Electric Power).

Thirdly, there are claims for **damages** (e.g. California vs. General Motors, Comer vs. Murphy Oil). Such actions are primarily directed against **companies** with especially high CO_2 emissions, such as the oil, coal and chemical industries, car manufacturers or meat producers. Another option are lawsuits against companies that finance industries with high CO_2 emissions and therefore make it possible for climate changae to occur. For example, in the case Friends of the Earth vs. Mosbacher, banks had to defend themselves against the accusation that when awarding loans to companies that use fossil fuels they disregarded environmental regulations, such as information requirements, set out in the National Environmental Policy Act (NEPA).

Such actions are not necessarily directed at an entire company. Shareholders could proceed against individual board members or managers who have failed to prevent liability claims or the imposition of government sanctions against the company, or who have violated a duty to provide adequate information or warnings. This latter case is all the more likely given the fact that there are still no clear guidelines governing the extent to which companies are obliged to provide information about their greenhouse gas emissions or about the de facto and legal consequences of climate change. This means that courts handling lawsuits on such matters still have a very broad scope for discretion.

Who brings these lawsuits?

Most actions so far have been brought by US states, US cities and NGOs (non-governmental organisations). However, initiatives have also come from private persons that have suffered from the effects of climate change such as the victims of Hurricane Katrina (Comer vs. Murphy Oil) or the Inuit people. Actions could also be brought by representatives of other industries that have suffered as a result of global warming, such as fishing or winter sports.

What is the legal basis for such lawsuits?

Actions against state organisations for their failure to act are usually based on violations of environmental protection regulations, especially the Clean Air Act (CAA), NEPA, the Endangered Species Act (polar bears) or the Kyoto Protocol. Claims for damages, on the other hand, are usually based on common law, and have seen a wide variety of approaches tried.

As most actions require some form of property ownership (private nuisance) or the violation of a specific duty towards the plaintiff on the part of the defendant (negligence), there is an increasing tendency to try to treat the emission of greenhouse gases as "public nuisance". This requires proof that the rights of the public have been affected. Such infringements may include health hazards or disruptions to public infrastructure, bodily injury and property damage, but also pure financial losses, business interruption and environmental losses.

What are the chances of such actions succeeding?
While lawsuits against state organisations have had varying degrees of success, claims for damages have so far failed. Firstly, so the reasoning goes, these cases involve political issues that need to be decided on by the legislature and executive and not by the courts. Secondly, it does not seem acceptable to blame defendants for "doing nothing more than lawfully engaging in their respective spheres of commerce".

Car traffic: Around 25% of US CO_2 emissions come from road transport.
Winter without snow: Winter sports are among the losers in global warming.

In spite of this, plaintiffs have won the odd decision here and there: for example, in Friends of the Earth vs. Mosbacher in 2007 the District Court of the Northern District of California denied the defendant's motion for summary judgement and went to great lengths to explain this decision. This can be seen as a sign that judges do not view such actions as completely hopeless. An important milestone for the prospective success of compensation claims was the decision by the US Supreme Court in Massachusetts vs. EPA, although the case actually dealt with a failure to act on the part of an authority: the Supreme Court ruled that greenhouse gases are to be considered pollution in the meaning of the Clean Air Act, which had previously been disputed, as greenhouse gases also occur naturally in the atmosphere without any anthropogenic influence. The Supreme Court also accepted the right of US (coastal) states to sue as they face the prospect of direct losses to their territories in the event of rising sea levels due to global warming.

What legal problems might prevent the success of such claims?

Success on the part of plaintiffs suing for damages is hindered by a range of seemingly insurmountable legal problems. The most important of these are:

a) Justiciability
Is this issue a matter courts have to deal with or is it rather a political problem that needs to be solved by governments and the legislature? Thus far, the courts have unanimously decided that the latter applies, i.e. they have rejected jurisdiction (see Connecticut vs. American Electric Power, California vs. General Motors, Comer vs. Murphy Oil).

b) Right to sue
Losses due to climate change are notoriously difficult to assign to a specific injured party. Who, therefore, is entitled to claim compensation? Up to now, courts have only clearly accepted the right to sue of US coastal states in respect of an impending loss of territory (Massachusetts vs. EPA).

c) Causality
The major problem, however, is establishing causality: firstly, it is not clear whether losses can be attributed to anthropogenic greenhouse gases or whether naturally occurring greenhouse gases alone would have been sufficient to cause the same damage. "Probabilistic attribution science" intends to overcome this hurdle by attempting to prove that anthropogenic emissions are very likely to have been responsible for losses related to climate change.

Losses due to climate change are notoriously difficult to assign to a specific injured party.

However, this approach will only be successful if the courts accept a specific degree of probability as proof of causality. Even in this case, plaintiffs must additionally prove that the specific greenhouse gas emissions produced by a specific defendant are responsible for the specific damage suffered by the plaintiff. This appears impossible given only the classic instruments of tort law.

Constructing liability would therefore require that
aa) the burden of proof be shifted or even reversed,
bb) courts accept proportional liability, e.g. as occasionally proposed for medical malpractice lawsuits in Germany but broadly rejected and denied by all courts, or
cc) jurisdiction accept market-share liability, which thus far has been recognised only in exceptional cases and subject to narrowly defined conditions. Market-share liability presumes, among other things, that there is a clear causal link between the loss and a faulty product, that significant causation by other factors can be ruled out and that there is sufficient data available to produce an exact breakdown of market shares.

Steinsholtsjokull, Iceland: The glaciers in Iceland are melting faster than glaciologists expected. This picture shows experts measuring the glacier tongue of the Steinsholtsjokull in the south of the island. **Ilulissat, Greenland:** The melting ice masses already pose a serious threat to the habitat of the Inuit peoples.

However, liability for the consequences of climate change fails on all of these points. In particular, not only is it impossible to rule out contributory cause of a loss by other factors: it usually exists to a considerable extent. It is also not clear how the market shares of different groups of greenhouse gas emitters, ultimately mankind as a whole, would be divided up. It seems highly unlikely that such options would be viable and that the central principles of tort law would be changed so significantly.

Nearly everyone contributes to the existence of greenhouse gases – for example as a car driver or by eating meat or dairy products. This contributory cause on the part of the plaintiffs would also have to be included in the calculations.

c) Lawfulness of defendants' behaviour
As a rule, liability presupposes unlawful, if not negligent, behaviour. Although exceptions to this are conceivable, they have so far usually been limited to neighbour law and activities in emergency situations (someone may in exceptional circumstances intervene in the rights of others but must pay for the damage that arises as a result). It is therefore doubtful whether one can be held liable if one has complied with all the regulations (rejected in California vs. General Motors, for example). This barrier to liability could, however, lose importance in the future, given the expected introduction of tougher legal regulation of greenhouse gas emissions: the stricter the greenhouse gas regulations, the more likely it is that the defendant has acted unlawfully by exceeding threshold values or by failing to fully comply with reporting and information duties.

Far fewer legal problems are caused by actions which are not directly based on the emission of greenhouse gases but on unfulfilled information requirements or the non-consideration of climate change in construction projects. However, unlike direct climate change actions, such lawsuits do not raise any new legal issues. In legal terms they are no different from traditional (professional) liability cases based on the breach of legal or other duties (of care). More on this point can be found on page 14, "Munich Re's position").

How are damages assessed in climate change litigation cases?
Even if the courts found a defendant liable in a climate change case, it would remain unclear how the amount of damages to be awarded to the plaintiff should be calculated. There would be four problems:
– Precisely what share of the greenhouse gases are man-made?
– To what extent have greenhouse gases emitted by a specific defendant harmed a specific plaintiff?
– How could the fact that most people also benefit in some way from global warming (e.g. lower heating costs, new agricultural opportunities) be considered when calculating the loss?
– How could the contributory cause on the part of the plaintiffs be included in the calculations, since nearly everyone contributes to the existence of greenhouse gases (e.g. as a car driver, by eating meat or dairy products)? This is a calculation which is just as difficult as determining the defendant's share of the damage.

What claims should insurance cover?
Even if one cannot assume at this stage that the legal hurdles will be overcome, it is still worth taking a look at some coverage issues. First of all, it depends which of the above-mentioned types of lawsuit applies.

a) Lawsuits requesting someone to act/not to act
Lawsuits which aim to force official authorities to take action are by their very nature not a topic for liability insurance, which indemnifies insureds for damage allegedly sustained and claimed by third parties. Because such lawsuits are not covered by liability policies, there exists neither an obligation to defend claims against the policyholder nor to assume the costs involved. Only lawsuits that seek to obtain compensation are covered. In principle, this also applies to lawsuits against the authorities, provided they have liability insurance.

Under water: If global warming is not stopped, the celebrity island of Martha's Vineyard on the east coast of the USA could be submerged within 100 years (lower photo).

b) Lawsuits seeking damages
In the case of lawsuits seeking compensation, public and product liability policies cover only bodily injury and property damage, but not pure financial losses (apart from special exceptions). Therefore, all that can be covered are claims resulting from genuine property damage, such as the destruction of property following a natural catastrophe, but not, for example, claims for a reduction in the value of a property that may be affected by rising sea levels in the distant future.

Where policies used to refer mainly to accidents, the definitions and interpretations have been extended over the course of time to include loss causes that are less sudden.

Professional liability and D&O insurance cover pure financial losses. Professional liability covers pure financial losses suffered by the policyholder as a result of errors or omissions committed in the pursuit of one's activities and especially a breach of the obligation to provide advice to third parties. This could involve, for example, the requirement that an architect provide information and advice concerning a particular method of construction. D&O insurance, on the other hand, covers violations of duty on the part of a company's board members (board of management and supervisory board of a joint-stock company, director of a private limited company) in carrying out their duties as managers of a company.

Occurrence: Does the emission of greenhouse gases constitute a loss event?
The idea of what constitutes a loss event changed in most countries in the 1970s and 1980s. The term event suggests a degree of suddenness or randomness. Where policies used to refer mainly to accidents, the definitions and interpretations have been extended over the course of time to include loss causes that are less sudden. At any event, cause and consequence must be clearly identifiable.

Furthermore, a loss event should incorporate an element of fortuity. However, these requirements can hardly be said to exist in the case of intended and approved emissions of greenhouse gases within the context of normal business operations. It may be a different situation if relevant amounts of greenhouse gases enter the atmosphere as the result of an incident or malfunction. However, it can be assumed that incidents with relevant emissions are virtually impossible given the industrial processes in place today.

What role does the so-called "pollution exclusion" play?
If cover is affirmed in principle, the question is then whether losses due to contributory cause of climate change are excluded, particularly through the environmental damage exclusions. In accordance with international environmental exclusions, CO_2 emissions will usually come under the "pollutants" exclusion. This interpretation is supported by the decision of the US Supreme Court in the case Massachusetts vs. EPA (the definitions of "pollutant" in the US Clean Air Act and ISO are similar in this respect).

As is the case with general liability policies, environmental damage is normally also excluded from D&O policies. Even if compensation claims are therefore usually sidelined, the legal costs involved may be covered. It remains to be seen whether the chequered history of coverage disputes about "pollution exclusions" will promote or hamper clarity regarding climate change in future claims.

Prof. Dr. Ina Ebert is an expert on liability law and emerging risks in Munich Re's Risk, Liability and Insurance Department. Her specialist areas are mass litigation, personal injury and liability issues related to violations of personality rights and new technologies.
Dr. Guido Funke is an executive manager responsible for Corporate Underwriting Casualty at Munich Re.

The environmental cost of meat production: Producing one kilogram of beef is as detrimental to the climate as making a 250-km car journey. The methane produced by livestock is one of the most significant greenhouse gases. **Oil refinery:** Most of our energy needs continue to be met by fossil fuels. There are still no binding CO_2 targets in place for all countries.

What is Munich Re's position?

It is undisputed that climate change is a global problem and that individual countries or market participants alone cannot hope to solve the problem. The responsibility for ensuring that this subject is taken seriously ultimately lies with governments, the private sector and consumers. How we deal with climate change is frequently the subject of national and international political debate.

Dr. Guido Funke

Climate protection and the question of who should pay for the costs of climate change are matters for politicians, not for compensation cases in the civil courts. Moreover, given the high transaction costs involved it would be hugely inefficient in economic terms to have such matters resolved by civil jurisdiction. The emissions trading model pursued in the Kyoto Protocol, on the other hand, is highly efficient. It endeavours to cut emissions overall and readily accepts that there are polluters that produce a lot of emissions. Against this background, it would be counter-productive and defeat the object of the system to have lawsuits against the biggest CO_2 emitters. It is also worth pointing out that the principle of insurance does not work in the case of compensation claims for climate change. If everyone is partially responsible, an equal balance provided by the community of insureds cannot be realised.

Is it important for Munich Re to distinguish between direct and indirect losses?

Compensation claims based on the fact that the policyholder has contributed to climate change and thus (in part) caused a loss, in other words a direct loss, should not be carried by the insurance industry. It is different in the case of losses only indirectly related to climate change – perhaps resulting from a failure to meet consultancy obligations because policyholders such as engineers, architects or consultants have not considered the consequences of climate change (cf. D&O). Such losses are not based on climate change itself but on the fact that someone has neglected to give the subject sufficient consideration in his or her professional activity. These losses are not untypical of liability insurance.

Just as the consultancy professions have to take account of legal or social trends, they also have to consider scientific aspects such as climate change.

Our position can be summed up as follows:

– **Coverage but more detailed assessment of the individual aspects of indirect losses**
Compensation claims based on clear misconduct on the part of the policyholder beyond the mere emission of greenhouse gases are a standard topic for liability insurance. In such cases, especially in professional liability and D&O, Munich Re in general provides reinsurance cover and deploys underwriting instruments to deal with those instances where the policyholder's risk management proves inadequate. For the exposed risk groups therefore, it will be necessary to examine more closely the extent to which the policyholder has taken account of climate change.

– **"Watching brief" and more restrictive stance on direct losses**
Claims for losses caused by a policyholder's direct impact on the climate should not be carried by the insurance industry. Munich Re assumes that there will not be any successful lawsuits involving this point. This is due to the fundamentally political nature of the liability issues, the absence of unlawfulness and the lack of evidence proving the causality of individual losses. Even if courts should change their point of view in this regard, Munich Re will not provide any corresponding capacity.

No change in underwriting

"Neither civil jurisdiction nor tort law is suitable for dealing with the direct consequences of climate change", is how Heike Trilovszky, Head of Corporate Underwriting, summarises the current discussion on this subject.

Topics: **The USA is witnessing an increasing number of lawsuits related to the effects of global warming, albeit with scant chance of success. Why has Munich Re chosen now to state its position on the topic of "climate litigation"?**
Heike Trilovszky: This topic is the subject of mounting public concern, especially in the USA, but the discussion at the moment is simply too emotional. As a global reinsurer, it is our job to consider such issues in a more matter-of-fact way. Our clients are also keen to hear our views on the subject. Ultimately, climate change and its consequences are an important strategic topic for Munich Re. This is why we have to look at all the aspects involved.

Topics: **Munich Re was one of the first companies to warn about the consequences of climate change. Do you not welcome the idea that those at least partly responsible for climate change should be held liable?**
Trilovszky: Happily, politicians are now taking climate change seriously and there is broad international agreement that global warming needs to be stopped. But civil law is not the right way to solve this problem. It needs to be tackled at a socio-political level.

Topics: **How?**
Trilovszky: This has to be decided by society and its political representatives, above all the legislature. In our opinion, tort law is a wholly unsuitable vehicle for this purpose – an opinion, incidentally, that US courts share with us.

Topics: **Is there any need for Munich Re to take action in terms of its underwriting practice, such as introducing new exclusions?**
Trilovszky: For now – no. Insuring the indirect consequences of climate change is part of our daily business, for example when a loss occurs due to a breach of reporting requirements or because someone fails to comply with his professional duties of care. This is insurable and will remain so. Nevertheless, we do examine whether climate litigation should be included in pricing considerations for certain classes of business. However, the direct consequences of climate change cannot, in our opinion, be addressed through tort law. Our current underwriting practice is therefore adequate. Should jurisdiction or legislation significantly change, however, modifications to our underwriting policy may indeed become necessary. After all, an incalculable risk is an uninsurable risk.

Heike Trilovszky is Head of Corporate Underwriting at Munich Re.

Contingent business interruption losses

Ever more rapid, flexible and integrated – value-creating processes in industry are changing with breathtaking speed. However, the more specialised and global production within an industry becomes, the more vulnerable it is to disruptions. And when things do go wrong, contingent business interruption (CBI) losses can entail enormous accumulation risks. Especially susceptible in this respect are the automotive and semiconductor industries. The key for the insurance industry is to know the loss potentials for a worst-case scenario.

Every day some 177,000 new cars roll off the assembly line worldwide.

Not everything grinds to a halt

In today's increasingly complex and interlinked global economy, even relatively minor disruptions can have huge consequences and bring entire areas of production to a standstill. Insurers then face substantial accumulation risks from contingent business interruption (CBI) losses. However, not all industries are affected to the same extent.

Dirk Herrenpoth

The value chain of manufacturing companies is subject to constant change. The need for companies to cut costs as a result of globalisation requires ever leaner and ever more flexible production processes. In order to minimise the amount of tied-up capital, companies reduce their stocks to a minimum and purchase primary and intermediate products ad hoc on the global market. The result has been the creation of interdependencies between companies in recent years. The downside to this is that production can soon come to a virtual standstill if essential components are not delivered on time. Even minor disruptions somewhere can cause considerable losses further downstream and perhaps far away.

From "just in time" to "just in sequence"

This problem is compounded by the fact that the number of suppliers for many products is falling (in extreme cases there may in fact be only one) as the number of end-product manufacturers increases due to the global outsourcing trend. The proliferation of high-performance IT systems has accelerated this development and has seen the "just in time" principle evolve into the "just in sequence" principle. The basis of this process is that the supplier delivers components not just in time and in the right amount but also in the right order (or sequence). Depending on the production system involved, the whole procedure can take anything from several days to as little as a few minutes.

This development poses a major challenge for insurers that cover CBI losses, as there are so many factors involved that can lead to a breakdown in production. Here are a just a few examples: wage disputes (strike), payment difficulties (insolvency) or loss events (fire, earthquake). As things stand, breakdowns in production from CBI losses are only covered if they result from events causing physical damage such as fire or earthquake.

Earthquake paralyses Japanese car industry

In mid-2007, an earthquake at Chuetsu in Japan showed just what can happen when production is disrupted. Riken Corporation, a company that supplies essential motor and transmission parts to the Japanese auto industry, experienced a total breakdown in production even though only a few machines had suffered minor damage. Not long after this, the production lines of all major Japanese car manufacturers stood idle. The loss in production amounted to some 120,000 vehicles. A team of hundreds of engineers needed a week to restore production at Riken.

The effects of a fire in autumn 2007 at the Matsushita Battery Industrial Co. were felt far beyond the borders of Japan. The damage forced the company to cease production of lithium ion cells altogether. Batteries urgently needed by OEMs (original equipment manufacturers) for notebooks, mobile phones and digital cameras could not be delivered on time. Several major international customers in telecommunications and camera production suffered CBI losses as a result. The overall insured CBI loss is estimated at several hundred million euros.

Timed to the second: Car manufacturers use robots more than any other industry.

Conventional mechanisms of accumulation control inadequate

Individual CBI losses do not pose any significant problems for the insurance industry. They take on special significance when a supply failure forces a number of different customers to halt production. Such accumulation potential can reach enormous proportions. However, it is not just the dimension that makes these accumulations critical. Given the global division of labour and the dynamics involved in the world economy, these accumulations are highly intransparent and subject to a rapid process of change. The standard accumulation control mechanisms (such as for natural hazards) simply do not work here.

Securing the supply chain is the top priority

Some branches of industry, such as the oil and pharmaceutical sectors, are less susceptible to accumulation-related CBI losses due to their value chains, and easy access to raw materials and alternative suppliers. However, the production strategies and manufacturing technologies used in other sectors, such as the automotive and semiconductor industries, make them much more vulnerable. To get an idea of the actual vulnerability involved, Munich Re has conducted a detailed analysis of these sectors, especially the auto industry.

Given the global division of labour and the dynamics involved in the world economy, these accumulations are highly intransparent and subject to a rapid process of change.

This sector not only has the highest exposure, the exposure also fluctuates strongly depending on the degree of production dependence. In talks with European suppliers and manufacturers, Munich Re has managed to gain valuable insights into risk management, contingency planning and the manufacture of key products. The study has revealed that companies give absolute top priority to "securing the supply chain".

Material damage proviso – What's covered and what's not

Property damage insurance provides cover against financial losses arising from physical loss of or physical damage to insured property. Business interruption insurance covers consequential losses arising from such physical damage. The principle that a cover for consequential losses applies only in cases where property has been lost or damaged must also hold for CBI covers. In other words, underwriters must avoid writing any CBI cover that obligates the insurer to indemnify losses caused by, for instance, the mere non-availability of energy or a supplier's failure to deliver due to insolvency or strike. These are not property risks in the true sense but rather enterprise risks which, moreover, require far greater accumulation control (e.g. political risks, credit risks).

Manufacturing techniques entail significant risks

Essential components in the automotive industry are usually supplied by external companies and delivered as required "just in time" or "just in sequence", with only so many components being stored at the assembly plant as are needed to ensure that production does not run into difficulties. From a CBI perspective, the manufacturing techniques in use are especially problematic. Many components are protected by patents or registered designs or are so specialised that it is not possible to switch to other suppliers at short notice. Naturally, the car industry is fully aware of these problems and does everything possible to avoid the worst case of a complete stop in production. This is a matter that not only concerns a company's financial risk but also its reputational risk. In emergencies, therefore, there are task forces in place to carry out measures designed to keep production going. During our analyses, we frequently heard that when the worst happens, manufacturers and suppliers work together with as little red tape or fuss as possible to come up with a viable solution.

Manufacturers and suppliers take stock

Especially critical are those components needed to ensure that a finished vehicle can leave the production line. These include transmission or motor parts, cable forms or certain types of computer chip. Other components, on the other hand, such as navigation systems or special headlights can be fitted later or assembled by the local dealer. It is the process involving these critical components that many manufacturers are starting to reassess.

They no longer look for the most cost-effective solution but try to broaden their supply network and so reduce dependencies on single suppliers. This shift in risk awareness can also be seen in the fact that manufacturers have started to analyse entire processes in terms of internal and external dependence and to develop "failure scenarios" which then form the basis of how they select suppliers. Given these risks to operations, business continuity is also becoming an increasingly important factor in strategic planning.

The CBI loss potential alone in the European automotive industry resulting from a worst case comes to some €2–2.5bn.

For their part, suppliers also go to considerable effort and expense to ensure that there is no breakdown in the supply chain. In addition to state-of-the-art risk management, such efforts include the way production is organised, for example in the form of international manufacturing networks, where mature products are made at a variety of locations. Where that is not possible, stringent fire-protection standards and active/passive fire-safety measures minimise the likelihood of lengthy interruptions to production.

The idea that suppliers manufacture components for certain production series at the car maker's plant is also a highly interesting concept. Although a close dependence exists, it only involves one production series and therefore virtually precludes any CBI accumulation. Moreover, in the event of a loss, manufacturer and supplier are both in the same boat, and the short channels in use facilitate speedy decisions.

Loss potential in the worst case

However, there will always be a residual risk: a series of unfortunate circumstances can trigger loss scenarios, emergency planning no longer works and many manufacturers suffer significant production breakdowns. Munich Re's analysis has revealed that the CBI loss potential alone in the European automotive industry resulting from a worst case comes to some €2–2.5bn.

Even everyday articles like mobile phones consist of more than 300 components.

Underwriting – Lessons learnt

Given the dimensions involved, risk assessment needs to go beyond the policyholder to include suppliers and a company's technical and economic dependencies. This is the central premise for continued insurance of CBI losses. From an underwriting point of view, therefore, this subject requires constant observation and analysis. Certain minimum standards have to be adhered to when structuring CBI cover. These include reasonable sublimits, a material damage proviso (see page 20) and due consideration of the quality of business continuity management when determining the amount of cover to be offered.

New developments in the pipeline

Besides conventional CBI covers, industry is increasingly requesting covers for business interruptions with no underlying physical damage. The insurance industry is working on the provision of capacities for this purpose. One option being examined is a separate cover outside existing property policies and treaties.

Accumulation under control

Our analyses have shown that the oil and gas and pharmaceutical industries have significantly lower CBI exposure than the automotive and semiconductor sectors. Although substantial individual losses are a possibility, these are easy to quantify with the known dependencies and easy-to-follow cross-links, which are already an integral component of PML calculation in underwriting. Given the size of the market, free tradeability, simple transport and ease with which raw materials and end products (oil and gas industry) and products for manufacturers of active ingredients (pharmaceutical) can be stored, scenarios portraying a massive loss of production involving a large number of major companies are simply not realistic.

The pharmaceutical industry also has its fair share of contract manufacturers, i.e. companies that do not conduct their own research and development and are specialised in producing active ingredients. However, CBI accumulation losses resulting from licensed production are relatively unlikely given the size of the companies involved. Subcontracting is not common among large pharmaceutical companies and the whole value chain is usually found within a single group.

In order to ensure the continued provision of much-needed medicines, competing companies have concluded support agreements with each another. In such agreements, the companies agree to provide each other with manufacturing capacity should production sites suffer damage.

Products are currently being developed which focus on medium-sized companies. When working out the scope of cover and pricing, individual risk assessment, especially in terms of supplier dependencies, should be the primary concern. In this way, risks such as transit, strike or insolvency could be covered with adequate limits. However, perils such as breach of contract or quality defects are likely to remain uninsurable. An important success factor for this type of cover is accumulation control which goes beyond classic property risks.

Capital market solutions on the rise

Certain CBI risks could also be transferred to the capital market in the form of securitisation. However, investors only assume risks that are sufficiently transparent and can be modelled by agencies accepted in the market. As a rule, only natural hazard risks are securitised on a parametric basis. This means that the issuer receives the investors' money when, for example, a defined windspeed (trigger) is exceeded at a certain location. The policyholder therefore carries the basic risk up to this defined trigger. When structuring the bond, it is especially important to ensure that this basic risk is kept to a minimum. In recent years, Munich Re has successfully securitised business interruption risks and is glad to make this know-how available to policyholders and insurers alike.

Although capital market solutions will become increasingly important in the future, it is traditional insurance that invariably provides better individual cover of the policyholder's CBI needs. Also, insurance solutions are frequently superior to securitisation in terms of cost efficiency. As a risk partner, Munich Re examines all cover options to ensure that we can develop and offer clients the best available protection at all times.

Dirk Herrenpoth is a senior underwriter in Corporate Underwriting Property at Munich Re.

Pharmaceuticals, oil and gas: Known interdependencies and straightforward cross-links mean the risks in this sector can be quantified relatively well.

The challenges of new manufacturing technologies

Semiconductors are used in the manufacture of numerous products nowadays. Most chips today are made using a planar process by which individual microelectronic circuits are produced on a wafer by applying layers of material. The finer the structures, the more chips can be placed on the wafer. In processor and memory chip production it is customary to quote the lateral dimensions in nanometres in order to distinguish between different processes. The most advanced process technologies currently have dimensions of just 45 nanometres.

With its high speed of innovation and technological advances, the semiconductor sector is all set in the next ten to 15 years to continue to conform to Moore's Law, which semiconductor pioneer George Moore formulated in the 1960s, namely that the number of transistors on a microchip and thus their performance will double every 18 to 24 months.

Various suppliers

The short product cycles and the rapid change in production technologies are constantly changing the interdependencies along the value chain. For this reason, Munich Re added another focus to its sector analysis by taking a closer look at the world's foremost semiconductor manufacturers. The past has shown that substantial CBI losses can occur if a supply failure is accompanied by insufficient inventory at a company, or capacity bottlenecks on the world market make it more difficult to find alternative suppliers.

Wafers: Microchips on a silicon wafer in the semiconductor industry.

The complex interdependencies within the value chain can be divided into three categories:

- Exposure of the semiconductor industry to manufacturers of base products
- Exposure of processing companies to the semiconductor industry
- Exposure of dealers to processing companies

The most important starting materials for chip manufacturers are the silicon wafers; there are just seven companies at different locations worldwide that make these wafers. In order to avoid overdependence, most major chip manufacturers buy their wafers from several suppliers. As keeping stocks of wafers is relatively inexpensive, it is customary in the industry to keep a three-month supply of wafers. If a supplier cannot deliver, there is more than enough time to find alternative sources. CBI accumulation exposure for this stage of production is therefore negligible.

12 to 18 months until the process is fully mature

The exposure situation is different for the processing companies. There is not just one manufacturer in the semiconductor industry that produces a certain chip for all customers. It is easy to find alternative products for most applications. However, that is not true of the most modern manufacturing technologies where a significantly higher number of more powerful microchips are cut from the wafer. New production processes are difficult to deal with, have a high reject rate and are thus only financially viable for top products. Only when the process has been tried and tested over a period of 12 to 18 months can it be used at other locations.

Generally speaking, older microchips can also be made using modern processes but not the other way round. For contingency planning, this means that if damage occurs at a semiconductor factory using an old production process, it is relatively easy to switch to another manufacturer with equivalent or more modern technology. For this reason, there is no reason to expect major CBI accumulation from processing companies that use older production processes.

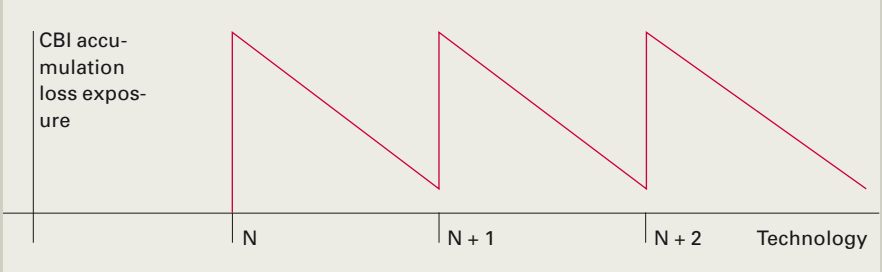
The price factor

Conversely, one can also say that the dependence on high-end microchips produced using state-of-the-art manufacturing processes is where the greatest CBI risk lies for the processing companies. This risk peaks with the introduction of a new technology and then diminishes gradually until the next technological advance comes along.

Keeping stocks of chips needed for a period of several weeks is not financially viable given the high price involved and the substantial price falls that occur within the first few months. There is little or no chance of finding suitable alternatives. Only when production capacity has risen suitably and prices have fallen is it financially viable to store chips over a longer period; at the same time, the number of alternative sources also increases.

Risk with new technologies

CBI accumulation exposure across various production processes



In the semiconductor industry, there is only the risk of high accumulation losses from the failure of one manufacturer if a new production technology is being used. This is because innovative production methods, such as the changeover to conductor structures 45 nanometres wide, are extremely difficult to control initially, so manufacturers introduce them gradually. Over time and with increasing experience, however, the technology is used at more and more locations, so that the failure of one production plant becomes less and less important – the accumulation risk falls. Not until the transition to the next technology n+1 does the loss exposure increase again significantly.

The risk of an accumulation loss is also low at downstream level between retail and processing companies and among processing companies themselves. The goods either go straight to wholesale as end products or as parts to the manufacturers of electronic equipment. On account of their high price, the latest-generation chips are only ever used for high-end products. These have standard interfaces and it is usually easy to find alternative older or equivalent components. The situation in retail is similar. If a certain component is not available, a comparable product can usually be found.

The analysis shows a high degree of dependence between suppliers and customers in certain stages of the technology cycle. The highest CBI exposure is found at production sites with the most modern technology. In other words, it is primarily the highly modern production sites of the technology leaders which can trigger high CBI accumulation losses.

Andreas Schlayer is an underwriter in Corporate Underwriting Property at Munich Re.

Healthcare market

The price of the commodity health has been steadily rising for years. State-run health insurance systems have reached their limits – more and more healthcare services are being privatised. But privatisation is only part of the solution. What is really needed is greater transparency, more personal responsibility, and a more targeted approach to managing insureds, doctors and hospitals. The role of the insurance industry in this sphere goes far beyond the mere assumption of risks.

New and more expensive treatments are constantly being developed.

Managing market participants intelligently

Healthcare is a growth market par excellence. The fact that health expenditures worldwide are growing much faster than GDP is testimony to this fact. This is not only true of highly developed economies. Emerging markets are also spending an increasing proportion of their national product on healthcare.

Dr. Ingrid Königbauer, Derek Proff

Unlike most economic sectors today, healthcare is not left entirely to the forces of the free market, as various state regulations eliminate many of these. However, this is by no means the only reason for the rapid increase in healthcare expenditure. The other reasons are found throughout the world: on the demand side, growing affluence and ageing populations; on the supply side, scientific and technological advances which permit new and possibly more expensive methods of treatment to be developed. The situation is compounded by an uneven spread of information among market participants, whereby frequency and duration of treatment can be increased artificially as patients cannot properly assess whether treatment is medically necessary. This is known as "supplier-induced demand". And for their part, patients often request too much treatment simply because they do not have to pay the full price for it. This behaviour is known as "moral hazard".

There is usually an uneven spread of information among market participants.

State-run health insurance systems can no longer support these rising burdens and have set about gradually reducing their basic level of healthcare. This means that insureds now have to finance more and more services themselves or take out private health insurance to make up the shortfalls in cover. Clearly, this opens up enormous opportunities for private health insurers – but significant risks as well.

To prevent services and costs mushrooming, they have to be controlled and actively managed. Consequently, the overriding trend today is towards greater specialisation. Insurers are having to expand their role from risk carrier to active risk manager, even to the point of vertical integration of clinics and other service providers. Strategies designed to ensure the profitability and sustainability of business are needed more than ever before. As a reinsurer, we support our clients throughout the world in this process.

Using new products for effective control

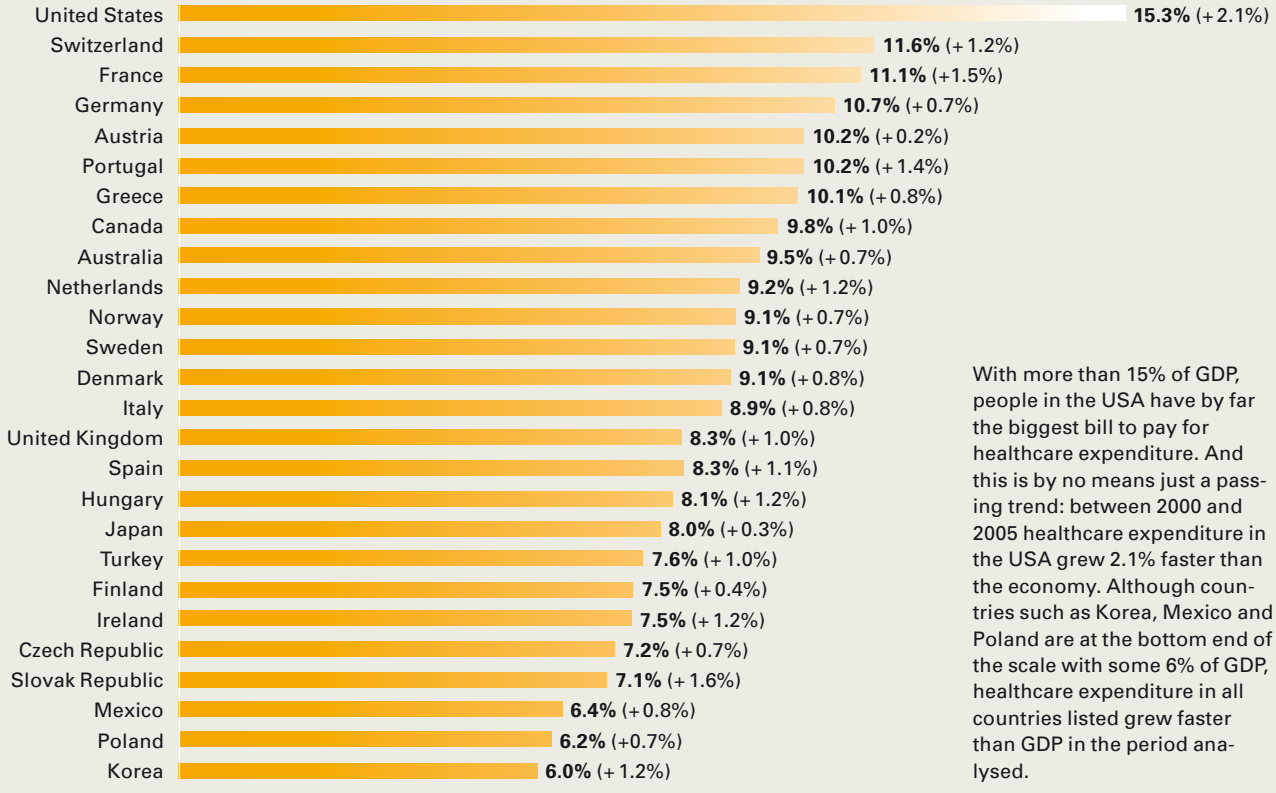
A critical factor for the success of the business are instruments that can have a positive influence on the participants involved. For example, these might include products that allow policyholders to play an active and intelligent part in the costs, such as a "health premium fund". This product concept is made up of two components: classic health insurance to cover predefined major losses and an individual fund to finance remaining healthcare services. Clients are rewarded for cost-conscious behaviour by way of a refund of the premiums that have been paid into the fund. Alternatively, they can leave this money to be invested in the fund and use it to build up capital. The conditions of insurance can be designed in such a way that clients actually have a financial incentive for leaving the money with the company. This aspect also makes health premium funds an ideal vehicle for client retention. State subsidies in the form of tax-exempt premiums and investment profits can add further appeal to this concept.

An expensive business: Costs spiral out of control if duration and frequency of treatment are increased artificially.

Health expenditures are rising faster than national product

Health expenditure as a percentage of GDP in 2005

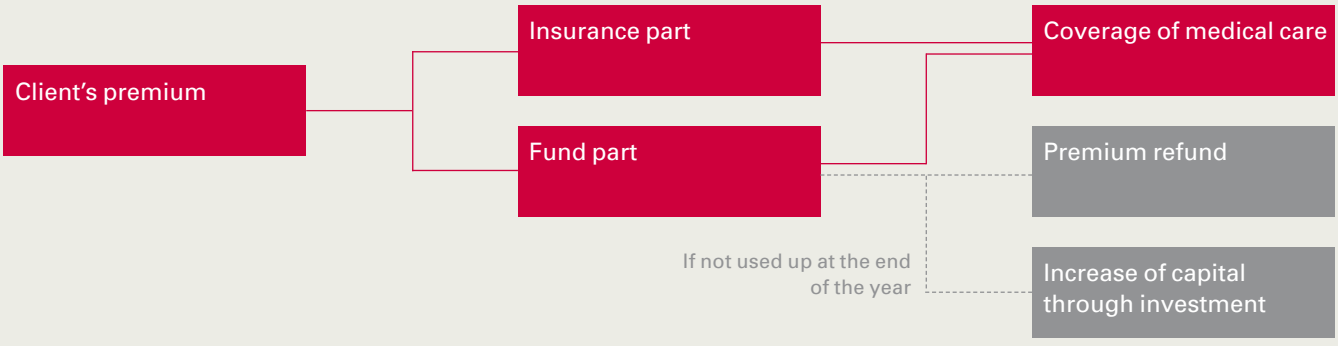
Growth in health expenditure between 2000 and 2005 compared with growth in GDP (in brackets).



With more than 15% of GDP, people in the USA have by far the biggest bill to pay for healthcare expenditure. And this is by no means just a passing trend: between 2000 and 2005 healthcare expenditure in the USA grew 2.1% faster than the economy. Although countries such as Korea, Mexico and Poland are at the bottom end of the scale with some 6% of GDP, healthcare expenditure in all countries listed grew faster than GDP in the period analysed.

Source: OECD

Health premium funds strengthen personal responsibility



Health premium funds, which combine an insurance and a savings component, offer insurance companies clear advantages: they are especially attractive for people with little or no health costs and are therefore very popular with "good risks". The insureds avoid unnecessary health costs and risks in order to claim their premium refunds or build up their healthcare funds.

Such products come under the category of "consumer-driven health plans". As a recent study by CIGNA (Choice Fund Experience Study, 2007) shows, such concepts have been able to reduce the increase in healthcare costs by half compared with traditional managed care products in the USA. These products can be designed very flexibly to suit individual market and client requirements.

By deploying suitable programmes, health insurers can avoid or at least reduce the costs of many chronic diseases.

As a reinsurer with global experience in the management of health risks, we support such innovations – from analysis and design right through to implementation.

Prevention and disease management

A major portion of healthcare expenditure today goes on so-called "civilisation diseases" such as diabetes and cardiovascular disease, which are frequently caused by an unhealthy lifestyle. By deploying suitable programmes, health insurers can avoid or at least reduce the costs of many chronic diseases. The Munich Re Group has developed a new concept for the German market, which combines health programmes with a reinsured performance guarantee (see box on the right).

Dr. Ingrid Königbauer is a senior consultant in Munich Re's Managed Service Care, Healthcare.
Derek Proff is a senior consultant in Global Business Solutions at Munich Re.

Innovative solution for statutory health insurance – An example from Germany

In Germany, the reform of the state-run health insurance market brings with it significant business opportunities. When the health fund is introduced in 2009, statutory health insurers will have to manage on the contributions stipulated for the fund and do without additional premiums. Costs will therefore become an increasingly significant factor in the competition for members.

The Munich Re Group supports statutory health insurers with a new, innovative approach in their efforts to cut costs. In cooperation with our intra-Group healthcare provider ArztPartner almeda, we offer health programmes specifically designed to reduce expenditure. These programmes can be based on specific areas such as cutting costs in the treatment of diabetes or COPD, or they can be used for comprehensive cross-cutting healthcare management.

At the same time, ArztPartner provides statutory health insurers with a performance guarantee. Munich Re covers this guarantee through a reinsurance contract. The combination of health programme, performance guarantee and reinsurance offers statutory health insurers an attractive product with the following advantages: they can save enormous costs with little investment of their own and the reinsurance element ensures the long-term nature of the business model.

Munich Re has already successfully launched this new concept – for the treatment of patients with chronic cardiac insufficiency. The client is an integrated healthcare company which coordinates and looks after the entire care needs of the registered insureds. ArztPartner receives a performance-based fee for its services. Munich Re reinsures the risk involved with this product.

Dr. Ingrid Königbauer

Who's paying for all this? Insureds need an incentive to cut costs.

Partners in risk

The booming economies of eastern Europe, Asia, the Gulf states and Latin America offer huge growth potential to health insurers. However, this growth potential is accompanied by significant risks.

Derek Proff

Deficits in the regulatory environment such as a lack of coding and accounting standards or of medical standards make it more difficult for health insurers to control the costs and services of providers effectively and to ensure the high quality of services.

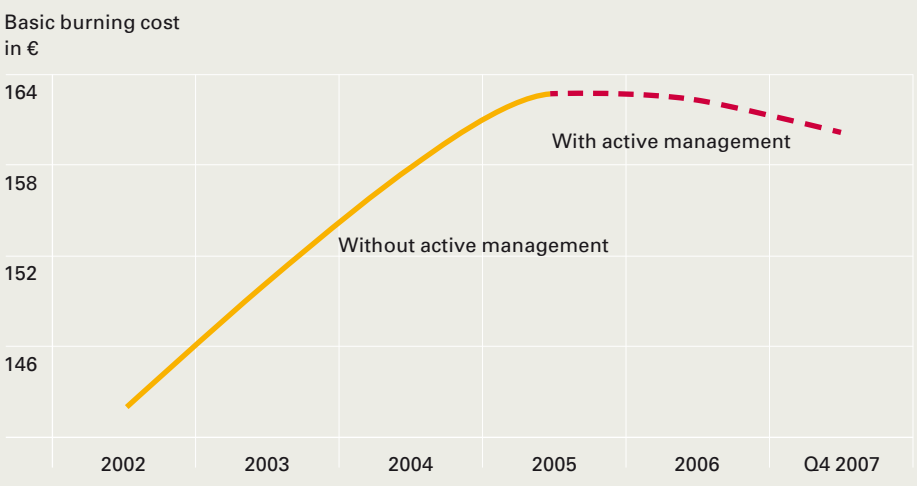
This is frequently compounded by imprecise policy wordings, poor underwriting or even long-term premium guarantees. Insurers frequently lack the experience and know-how needed to manage health portfolios. The upshot of all this is that many companies post losses and assume long-term incalculable risks. This is a development that can be seen in many large emerging markets.

Munich Re's Divisional Unit HealthCare actively supports its cedants in their efforts to ensure the profitability and growth of their health portfolios. Our service covers both the management of existing portfolios and the development of new products. A team of actuaries, product developers and experts from claims, medical management and IT work hand in hand with our clients. Here is an example:

Background: An insurer operates and manages its health insurance portfolio as an integrated component of its life portfolio. The premium volume amounts to several hundred million euros.

Problem: The insurer cannot implement premium adjustments in the market which are sorely needed as a result of rising claims. The combined ratio has exceeded 100%.

Cost development significantly stabilised



A portfolio's basic burning cost shows the claims development of a portfolio independent of its composition (ageing, lapses, etc.). A basic burning cost of €150, for example, shows the average claims amount on the assumption that the portfolio consists only of insureds of a certain reference age.

Source: Munich Re

Not even emerging markets are immune to rising healthcare costs.

Project approach: An actuarial analysis of the basic burning costs of the portfolio shows that the morbidity trend, i.e. the claims development independent of portfolio composition and ageing, has performed less favourably than local benchmarks. A team of experts from Munich Re and the company identify specific measures for the actuarial analysis, data management and claims management. The objective is to cut costs.

The following measures were implemented:
- A data-based management system was set up to identify cost trends and their causes.
- The responsibility for claims management was shifted from marketing to operative business.
- The claims process was optimised and the claims management locations reduced from seven to three.
- Specialist claims teams were established to process particularly difficult cases in predefined areas.
- Finally, the medical guidelines were improved significantly.

Reinsurance treaty: Unlike traditional consulting firms, we participate directly in the success or failure of our services. If the result of the insurance improves, we participate in this, but also if it deteriorates. This helps to harmonise the long-term interests of both parties.

Measurable success: While the basic burning costs rose continuously between 2002 and 2005, the measures outlined above helped to stabilise the trend within the space of a year.

This service-based risk partnership is a prime example of how consultancy and reinsurance can be combined successfully. With this basis as our principle, we are able to support cedants in different regions of the world and with a wide variety of problems.

Derek Proff is a senior consultant in Global Business Solutions at Munich Re.

Transparency, networking, management

Countries throughout the world are having to contend with rising health costs. Unfortunately, there is no ready-made cure for this problem. In an interview with Topics, Munich Re health economist Dr. Franz Benstetter gives his views on current trends, weaknesses in the system and possible solutions.

Interview with Dr. Franz Benstetter

Topics: Health expenditure has risen astronomically in recent years. Is this trend irreversible?
Dr. Franz Benstetter: Ageing populations, technological advances, and the way doctors and insureds approach healthcare are inevitably pushing up costs. Quite simply, more and more state systems are reaching their limits at an alarming pace. And this cost spiral is set to continue in the future. In Japan, with its extremely ageing population, the elderly already have to pay up to 30% of their healthcare costs out of their own pocket. One cannot simply reverse the way healthcare has developed. But there are countless ways to improve efficiency, especially in developed countries.

Topics: Is privatisation a possible solution?
Benstetter: Private insurance is part of the solution, and the trend towards more private care and competition will increase. Another option is cooperation agreements, an area in which the Munich Re Group has already launched several successful initiatives. For example, in cooperation with the government in Abu Dhabi we have introduced the first specialist health insurance there for expat workers. The scheme already boasts nearly a million insureds, and other states in the Middle East are considering introducing similar models. Another example is an integrated care model that we have established in Spain. As of autumn 2008, DKV Seguros will take over responsibility for the medical care of people in the Denia region. Healthcare and management from one source will help ensure that costs do not spiral out of control.

Topics: What do private companies do better?
Benstetter: Private health insurers are simply more efficient in a range of different areas. For example, they design products that incorporate market-economy incentive schemes and preventive measures. (Re)insurers with international know-how can integrate a variety of care modules and manage patient care better. For example, we conduct analyses which show how individual managed care instruments influence the behaviour.

Topics: Do patients want to be managed?
Benstetter: Health is an emotional topic, and the freedom to choose their own doctor is very important to most insureds. However, many patients find this task beyond them and don't really know where to start. Preferred provider organisations (PPO) have long been successful in the USA, as they combine the freedom to choose one's own doctor within their network with quality ratings of providers. This is the basis of so-called medical management. With this approach, hospital visits can be optimised or avoided altogether and unnecessary treatments prevented. A typical example of this is hip joint replacements, where the different stages of treatment have to be coordinated.

Topics: Do providers such as doctors and hospitals really want transparency?
Benstetter: Healthcare providers are commercial enterprises that have to compete successfully in order to survive. More transparency strengthens competition. A provider that offers a high-quality and affordable service will inevitably prevail in the long run. Demand for these services will increase. Incidentally, this is exactly what the providers want from our MedNet networks. In exchange for greater transparency and control, they expect a significantly higher number of patients in return. In this way, everyone benefits.

The healthcare industry is becoming increasingly complex but also increasingly volatile. Primary insurers can even out these fluctuations through reinsurance.

Topics: Let us take a look at primary insurers. Where are they feeling the pinch most and how can we help them?
Benstetter: The healthcare industry is becoming increasingly complex but also increasingly volatile. For example, large claims are on the rise: just think of transplants or cancer treatment. Primary insurers can even out these fluctuations through reinsurance. At the same time, the requirements for product design and claims management are increasing. Non-specialist primary insurers that offer health insurance as an add-on product only may find it difficult to cope with this complexity. We use our international experience to develop tailored and efficient solutions.

Topics: What system do you as a health economist advocate?
Benstetter: In terms of health economics, a combination of state-run primary care and private top-up care is best. However, the primary care should contain as many private elements as possible, not just complementary but also substitutive. Regardless of which system is in place, we also need more incentive schemes, as they contribute greatly to reducing inefficiencies. However, the fundamental requirement for a solid system is greater transparency. If all participants, including the patients, have a better idea of the services and costs, it increases the responsibility of everyone involved. Of course, such a system must also guarantee that serious illnesses receive the treatment and services they require.

Topics: When will this process of slow structural change speed up?
Benstetter: In regions with a long tradition of health insurance, such as Europe, this is indeed a lengthy process. There are still enormous conflicts of interest involved. However, after a lengthy "lead time" things can then progress remarkably quickly. For example, after 30 years of debate the Netherlands introduced a private-sector system in 2006. In many emerging countries which do not have a tradition of state-run systems, the flexibility that private health insurers have is that much greater.

Topics: Could globalisation speed up the process of change. For example, the idea of Germans or French people going to Romania to have their teeth done.
Benstetter: Essentially, health is a commodity like any other – the price determines the demand. Within Europe, we are observing a trend where more and more patients are travelling abroad for treatment in order to reduce their co-payments. For Germans, eastern European countries are an attractive proposition for dental prostheses. Although in principle all EU citizens are entitled to have treatment in any other EU member state and reclaim these costs from their health insurers, routine treatment has thus far largely remained a local matter. There is no competitive pressure here to press for domestic structural change. Just take a look at the situation in the UK. Long waiting lists for operations mean that many patients go abroad for treatment and this has not brought about a structural change there.

Dr. Franz Benstetter, Head of Managed Care Services in the HealthCare Division of Munich Re. He is responsible for the development and running of managed service organisations and medical networks. Recently he won a top science award in health economics.

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