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# The Impact of Gender-neutral Pricing on the Life Insurance Industry

BY

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## **Abstract**

The main principle of insurance requires that the premium charge to the consumer reflects his/her profile. As suggested by numerous works of literature, an individual's age is by far the most important factor in determining risk profile. Next to age, gender is arguably the second most significant factor. The implementation of gender-neutral pricing in December 2012 has had a major impact on the life insurance market due to the inequality between risk profiles since men generally have a higher mortality rate than women. To make inferences on the potential market responses to the ruling, this report has examined the economic model developed by Rothschild and Stiglitz (1976).

This report focuses on the ruling's impact on term assurance policies and has determined that the initial actuarially fair unisex premium should be based on the weighted average of male and female premiums prior to the ruling. Nevertheless, an immediate concern for insurers is whether their business will attract a higher-than-expected proportion of male consumers in the future. This has led to the inclusion of a gender mix risk margin to protect insurers against the uncertainty of future gender composition. As an alternative to the inclusion of a gender mix risk margin, insurers could manage the risk through a change in product design and the use of targeted marketing. Also, the implementation of gender-neutral pricing has compelled insurers to modify their risk classification system through increasing the weight assigned to other risk factors – this report has suggested increasing the weight assigned to the sum assured. Furthermore, insurers are actively seeking new risk factors to replace gender as a risk factor in the pricing process. This report has discussed the potential indirect sex discrimination issue that may arise.

In addition, this report has examined the adverse selection hypothesis; that is, the higher-risk gender intentionally takes financial advantage of the unisex pricing system by demanding more insurance than they would prior to the ruling.

Demand for insurance can be broken down into two components; that is, the rate of insurance uptake and the amount of insurance coverage bought. It has been identified that adverse selection by insurance uptake is determined by the elasticity of demand of the market. On the other hand, the theory of ‘passive adverse selection’ suggests that adverse selection by insurance coverage is determined by a function that consists of many factors, such as level of risk aversion and level of income. In the UK, 67% of insurers experienced higher-than-expected male policyholders in their portfolio a month after the implementation. However, empirical data suggests that those males who purchased a term assurance policy did not intentionally buy more coverage.

Furthermore, there is speculation that a ban on using age as a risk-rating factor might happen in the future since the EU is currently working on an age and disability directive. As noted, an individual’s age is by far the most important factor in determining risk profile. The industry fears that this potential ruling will lead to a vicious cycle of increase in premium and shrink in market size; this phenomenon is also known as adverse selection ‘death spiral’. This report has chosen to review the ‘pure community rating’ that was adopted by the New York health insurance industry during the 1990s. Evidence has shown that there is no evidence for the dire prediction of adverse selection ‘spiral’. This suggests that the life insurance market in the UK may be able to tolerate additional policy intervention by the government.

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## **Section 1 Introduction**

Premium rates quoted by insurance companies will vary across consumers, depending on his/her risk profile. An individual's risk profile indicates his/her likelihood of making a claim and is assessed by insurers via a list of risk-rating factors. The most conventional risk-rating factors for life insurance products are the consumer's age, gender and smoking status. For life insurance products, age is by far the most important determinant (Brown et al., 2004). Besides age, gender is the second-most important factor.

All things being equal, insurers would charge men and women different premiums based on their gender and the amount of difference is significant. As a result, this disparity had raised ethical concerns about the pricing method that has been widely adopted by Actuaries for centuries. The practice of considering a person's gender in the calculation of premium constitutes sex discrimination under the Sex Discrimination Act.

### **1.1. Background**

The sex discrimination issue was originally raised by a Belgian consumer association – Test-Achats – along with two private individuals (Case-law of the Court of Justice, 2011). A lawsuit was later brought up to challenge the lawfulness of allowing insurers to take account of an individual's gender in the calculation of premiums and benefits.

On 13 December 2004, the gender directive was first introduced (Council Directive 2004/113/EC, 2004). It aims to enforce the principle of equal treatment between men and women in the access to and supply of goods and services, including insurance. While this directive has prohibited the use of gender as a rating factor in insurance pricing, it does nevertheless contain a derogation clause



in article 5(2) of the directive which gives Member States the discretion to opt out from the regulation, subject to certain conditions (Slaughter and May, 2011).

According to the directive, Member States may permit the use of gender as a determining factor for premiums and benefits as long as it is based on “relevant and accurate actuarial and statistical data”, provided that such data is “compiled, published and regularly updated in accordance with guidelines issued by local authority” (Council Directive 2004/113/EC, 2004).

In the UK, the gender directive was implemented on 6 April 2008. Despite the enactment, insurers proceeded with their initial practice under the derogation clause and continued to allow for gender difference in the calculation of premiums and benefits. Soon the legitimacy of the opt-out clause was challenged by the public and was criticised for violating the Charter of Fundamental Rights of the European Union. The European Court of Justice (ECJ) noticed there was a risk that the EU law would permit the derogation to persist indefinitely which would potentially work against the achievement of the objective of gender equality.

As a consequence, the ECJ made a final ruling on the Test-Achats case on 1 March 2011 which invalidated the derogation clause and mandated a change on Member States. Having considered that gender has been a long established risk-rating factor in insurance pricing, the ECJ had allowed a transition period for insurers to prepare for the transition to gender-neutral pricing. From 21 December 2012 onwards, insurers in all 27 Member States have been prohibited from using gender to determine premiums and benefits.

## **1.2. Aims and Objectives**

This report aims to evaluate the impact of the ban on the use of gender as a risk factor on insurance companies’ business practice, in terms of pricing, marketing

and adjustment of their risk classification system. Also, it investigates the adverse selection hypothesis; that is, the higher-risk gender intentionally takes financial advantage of the unisex pricing system by demanding more insurance than they would prior to the ruling. In addition, it assesses the market's ability to tolerate the ban on the use of age as a risk factor in the future.

### **1.3. Structure of Report**

The report is structured as follows. Section 2 presents the conceptual framework of insurance pricing and the advantages of using gender as a risk factor from an operational perspective. Moreover, the biological and behavioural evidence supporting the mortality difference between genders is examined. To investigate the factors that influence government policy design, this report begins by inspecting the European Commission's argument supporting the idea of gender-neutrality and further develops its argument into a discussion of different moral values and how they conflict with each other. To illustrate, two renowned philosophical views are put forward, namely utilitarianism (or consequentialism) and deontology.

Section 3 begins by introducing the canonical model of imperfect information by Rothschild and Stiglitz (1976) to assess the impact of the ruling on the insurance industry. Moreover, it will demonstrate the calculation of 'actuarially fair' premium rates on a gender-neutral pricing basis and discuss additional problems that arise which affect an insurer's ability to set a risk-reflective price. Last but not least, it will discuss other strategies available to insurers, including targeted marketing, change in policy design and the search for new risk factors.

Section 4 investigates the adverse selection hypothesis by examining different factors that cause adverse selection in the life insurance market. Firstly, the correlation between the demand for insurance and individual risk levels

constitutes the essence of adverse selection. Demand for insurance can be broken down into two components, namely the rate of insurance uptake and the amount of coverage purchased by the higher-risk gender. For each component, empirical evidence in the UK as well as theories will be presented accordingly. Finally, this report reviews past experiences from New York's 'pure community rating' to make inferences on the UK market's ability to tolerate the further ban of using age as a risk factor.

## **Section 2 Gender and Insurance Pricing**

The implementation of the gender directive has had a major impact on the life insurance industry. Before the analysis begins, it is important to understand how the insurance pricing mechanism operates and why gender had such an important role during the process. This section goes beyond statistical ground and examines both biological and behavioural evidence supporting the mortality difference between men and women. Furthermore, through inspecting the European Commission's statement supporting the implementation of gender-neutral pricing, two distinct sets of moral values are identified and their influence on government policy design is evaluated accordingly.

### **2.1 Economic Principles of Insurance Pricing**

This section aims to provide a framework for more in-depth discussion in later sections. To begin with, it states the assumption and principles behind insurance pricing. It then explains how the risk classification system helps insurers to set cost-reflective premiums for each potential policyholder individually and prevent cross-subsidy between high-risk and low-risk policyholders.

#### **2.1.1 Risk Pooling**

The insurance mechanism is a process that allows policyholders to 'pool' their aggregate risk; that is, remove the risk carried by a specific individual and spread it across to other policyholders. Its existence largely relies on the assumption that the average policyholder is *risk-averse*. Under this assumption, an individual will prefer small but certain loss (equivalent to the amount of insurance premiums paid) rather than large but highly variable loss (equivalent to the benefit received) when both have the same expected loss value.

Another key principle is that all claims paid out must ultimately be met by the premiums collected from policyholders (plus investment income earned thereon). In other words, the total premium income must be at least equal to expected claim costs. The role of an insurance company is to act as an intermediary in the ‘pooling’ process. Meanwhile, costs will be incurred by the insurance company in performing its role – for example underwriting, administration and marketing – and therefore an additional margin will be added to recoup the expense incurred. On top of that, a profit margin may be included as a reward for their services.

### **2.1.2 Risk-Based Pricing and Risk Classification**

Due to the fact that insurance products offered in the market are very much alike, price automatically becomes a major determinant for the decision making of consumers. Under this market pressure, insurers are urged to keep their premium rates as low as possible for each consumer as long as it is sufficient to cover the expected claim cost.

The *risk-based pricing* method, which aims to calculate as accurately as possible the expected cost for each potential policyholder as an individual, is fundamentally important for insurance pricing. Practically, it is impossible to estimate the expected claim cost for each potential policyholder individually because it is both economically inefficient and statistically inappropriate (American Academy of Actuaries, 1980). For instance, requesting policyholders to undertake numerous medical and specialist tests would increase the cost of underwriting which would ultimately be borne by the policyholder via a higher premium rate, thus reducing its competitiveness. The majority of insurance pricing relies on the Law of Large Numbers to make statistical inferences and using the individual assessment approach may not be appropriate in this

circumstance. Given that individual risk assessment is not viable, this leads to the use of risk classification.

*Risk classification* serves the same purpose as the approach above which aims to estimate as accurately as possible the expected claim cost for each potential policyholder and helps the insurer to set risk-reflective premiums accordingly (Society of Actuaries in Ireland, 2004). For life insurance products, insurers use a range of risk-rating factors to determine the risk profile for each individual. The most conventional factors include age, gender, occupation and smoking status. In using risk classification, insurers are able to split policyholders into different risk groups and risks are pooled within each group. Ideally, members within the same group will carry identical risks to the insurance pool and will be charged the same premium accordingly.

### **2.1.3 Cross Subsidy and Theory of Subsidy Aversion**

It is important to stress that risk classification is not an exact science. While increasing classification should, in theory, be able to bring individuals closer to an identical/homogenous risk profile, heterogeneity will always remain. Within any risk group, *cross-subsidy* may arise as a result of the inequality between risk profiles, e.g. policyholders at the lower-end risk spectrum paying for the policyholders at the upper-end risk spectrum who possess higher loss expectancy. Moreover, the presence of cross-subsidy would create an incentive for *adverse selection* by consumers. Adverse selection refers to an individual, motivated either directly or indirectly, to take advantage of the risk classification system because he/she possesses private information.

If risk classification is not adequate, it is often assumed that high-risk customers will demand more insurance. Nonetheless, this is based on the belief that they have more knowledge about their actual risk than their insurers and this belief is

debatable (see the discussion of self-perceived state of health in section 4.1.2). In addition, the theory of subsidy aversion suggests that low-risk policyholders will refuse to accept any premiums higher than the risk-reflective (actuarially fair) premiums because they are reluctant to contribute towards the losses incurred by high-risk policyholders (Thiery and Van Schoubroeck, 2006). Subsequently, they will withdraw from the risk pool.

#### **2.1.4. Operational and Actuarial Considerations in Modifying the Risk Classification System**

In theory, cross-subsidy between policyholders could be eliminated through increasing classification, i.e. adding infinitely many risk factors into the system (provided that there are still a sufficient number of policyholders to make statistical inference). However, within any particular risk group, the notion of identical risk profiles is not attainable for the following reasons.

Increasing risk variables will certainly carry additional costs. In a competitive market, insurers will have the incentive to refine their risk classification system as long as the cost of this produces a net gain, i.e. the cost of differentiation per person is lower than the amount of cross-subsidy each low-risk customer pays. Also, on statistical ground, the considerations between homogeneity and credibility are somewhat conflicting. As previously mentioned, higher levels of classification would improve homogeneity in each group, but at the expense of statistical credibility.

#### **2.2 Gender as a Risk-rating Factor**

The section above explains how risk classification helps insurers to determine risk-reflective premiums for customers and prevent cross-subsidy between policyholders. Also, any addition of new risk factors requires a balance between

cost and overall gain. In the following section, this report investigates the benefits of using gender as a risk factor for insurers from an operational perspective. Moreover, it has been statistically shown that there is a significant mortality difference between men and women. This report goes beyond statistical ground and examines the biological and behavioural evidence supporting the disparity in gender mortality.

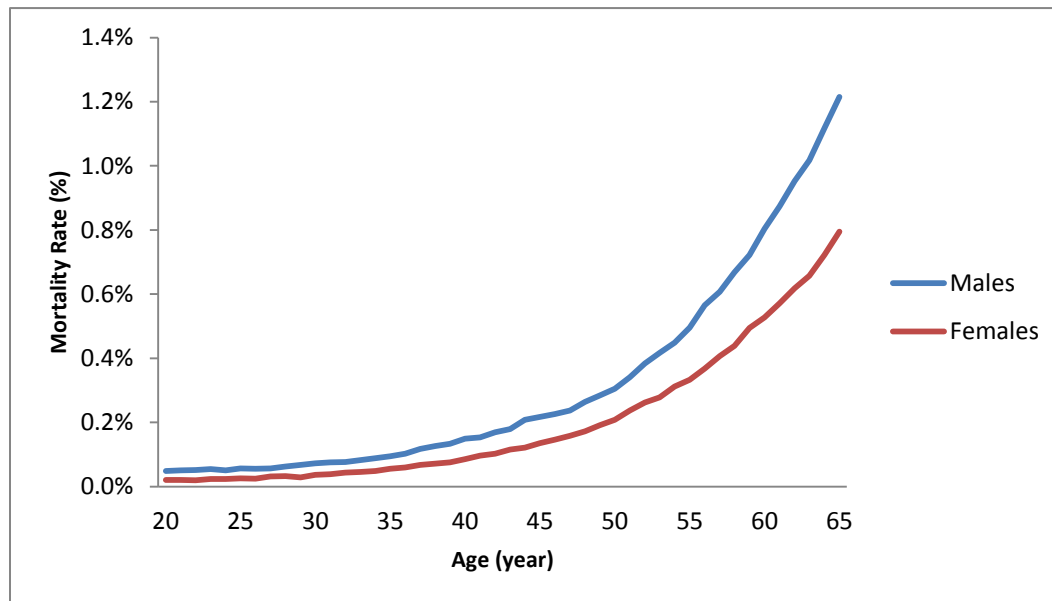
### **2.2.1 Advantages of Using Gender as a Risk-rating Factor**

As mentioned above, insurers will always prefer those that are ‘cost-effective’ when searching for new risk factors. For a rating factor to be efficient, it must meet a range of criteria (American Academy of Actuaries, 1980).

*Statistically reliable* – numerous studies suggest that gender has a strong correlation to mortality rate and this correlation has been consistently significant for a long period. The fact that men have a higher mortality rate than women was observed at least as far back as 1750 when the first national census was computed in Sweden (Kalben, 2002). To illustrate, figure 1 below presents the mortality rate of men and women in England between 2010 and 2012. Age, as indicated by the graph, is the prime determinant for estimating life expectancy and mortality rate increases significantly with age. Besides age, gender is arguably the second most significant factor to determine life expectancy. For all ages, men experience a higher mortality rate than women.



**Figure 1: Mortality difference between men and women in England, 2010-12**  
(Office for National Statistics, 2013)



Note: Interim Life Tables, England, 1980-82 to 2010-2012

*Practical, cost-effective and responsive to change* – gender is an excellent risk variable as it is readily measurable and verifiable; for instance, it can be easily verified from personal identification documents. The low cost of obtaining data can benefit policyholders via lower premium rates. In addition, gender as a rating factor is easier to trace than other factors, such as occupation, smoking status and income, which could vary over-time and thus lead to a possible change in underlying risk.

*Objectivity* – it is important that each risk category is defined clearly and objectively. For example, the definition of ‘fit’ may be considered as vague when assessing level of health.

### **2.2.2. Biological Evidence Supporting Mortality Difference between Genders**

The gender gap in mortality can be observed in all countries. Many works of research have been conducted in an attempt to identify the underlying reasons and have concluded that it is predominantly attributed to biological and behavioural factors.

Biological factors focus on an individual's genetics and androgen and estrogen levels. Genetics, in the form of X and Y chromosomes, are found in the human body. The gender of an individual is determined by a pair of sex chromosomes which could result in either an XX or XY configuration, which represents female and male respectively. Research has identified that the X chromosome contains numerous genes that control biological processes, such as immunoresponsiveness (the capacity of the immune system to develop a response), whereas the Y chromosome contains less genes and is unrelated to biological process control. An additional X chromosome in females has tremendously increased their lifespan as it allows their immune system to respond to infections more vigorously than males.

Moreover, there is strong evidence to suggest that female hormones – estrogens and progesterone – protect the heart and blood vessels by removing low-density lipoprotein (also known as 'bad' cholesterols) which helps to prevent the formation of fatal blood clots or coronary artery damage as well as providing an anti-aging effect (Kalben, 2002). On the other hand, male androgens (notably testosterone) accelerate the aging process as well as promote high blood pressure and hence increase the chance of circulatory system disease.

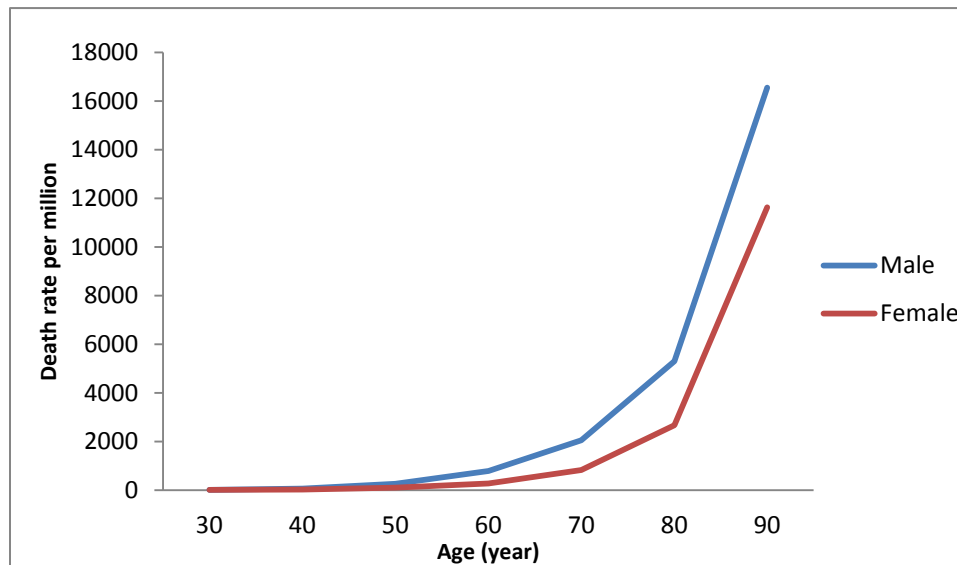
**Table 1: Death rate per million population (selected underlying cause) in England and Wales, 2012** (Office for National Statistics, 2013)

<b>Underlying Cause</b>	<b>Number of Deaths in 2012</b>	<b>Proportion to Total Deaths by Disease (%)</b>
<b>Disease of Circulatory System</b>	137377	31%
<b>Neoplasms</b>	106355	24%
<b>Disease of Respiratory System</b>	74076	16%
<b>Total</b>	<b>317808</b>	<b>71%</b>

Note: Deaths registered in England and Wales, 2012

Table 1 (Office for National Statistics, 2013) shows that, of all the causes of death in 2012, death caused by disease of the circulatory system (namely heart diseases: chronic rheumatic, hypertensive and Ischaemic etc.) accounted for 31% and was the leading cause of death. Diseases of the circulatory system still remain the biggest cause of death.

**Figure 2: Death rate per million for males and females aged 25 or above in England and Wales, 2012** (Office for National Statistics, 2013)



Note: Deaths registered in England and Wales, 2012

It can be seen from figure 2 that, among those deaths caused by circulatory diseases in 2012, males had a significantly higher death rate than females.

### **2.2.3 Behavioral Evidence Supporting Mortality Difference between Genders**

In addition to the biological factor, another cause of the gender gap in mortality is differences in behavioural pattern. Being consistently exposed to high levels of testosterone, some have suggested that men have a higher propensity to engage in activities or habits that increase the chances of ill-health or death, such as smoking, excess alcohol intake and drug abuse. This report has chosen cigarette smoking as an example.

Cigarette smoking is well known for its effect on mortality rates, as informed by numerous studies. All things being equal, a cigarette smoker would have a heavier mortality rate than a non-smoker due to the significant correlation between

cigarette smoking and various diseases, particularly lung cancer. According to Cancer Research UK (2014), smoking is estimated to cause approximately 86% of all lung cancer deaths. Every year, around 5 million people die from cigarette consumption and exposure globally. Around the world, 47% of all men and 11% of all women are smokers. In addition, it has been observed that male uptake of smoking generally occurs sooner than female uptake in most countries. Nevertheless, these gaps are slowly diminishing in developed countries due to the risk-taking behaviours of women slowly merging with those of men (World Health Organization, 2006). In the UK, the latest male:female smoking status proportion is roughly similar for all age groups (Office for National Statistics, 2014).

Another hypothesis regarding the gender mortality differential involves the distinctive attitude towards utilising healthcare services; that is, men are more inclined to delay as much as possible before seeking medical attention while women act to the contrary. In addition, some have proposed that women are more sensitive to physical discomfort which results in higher frequency visits to their general practitioner (Kalben, 2002). Because of this, the existence of fatal disease can be identified at an early stage, thus increasing the chance of curing.

### **2.3 The Rationale of Gender Neutrality and Causes of Government Intervention**

From an operational perspective, the use of gender as a risk factor was able to provide a relatively costless measure for expected claim cost prior to the ruling. In addition, the gender difference in mortality is supported by biological and behavioural evidence; thus incorporating it into the insurers' risk classification system should allow a more risk-reflective/competitive premium to be determined for customers.

The next section focuses on analysing factors that cause changes in government policy. It begins by inspecting the European Commission's statement against the use of gender-based pricing. It will further develop the argument into a wider scope, namely the conflict between a consequentialist's view of 'fairness' and a deontologist's view of 'fairness'. This helps Actuaries to ensure that every business decision is well-funded and justifiable on both statistical and moral grounds.

### **2.3.1. European Commission's Argument Against Gender-based Pricing**

According to the statement published by the European Commission, it argues that gender should not be a determining factor for life expectancy, but rather lifestyle factors appear to be more relevant, for example marital status, occupation, smoking and nutrition habits (Society of Actuaries in Ireland, 2004). As suggested earlier, this argument might be valid as some studies have predicted that the gender mortality differential is diminishing due to the risk-taking behaviours of women slowly merging with those of men. On top of that, medical advancement has increased the survival rate of patients suffering from circulatory diseases.

Moreover, risk-taking behaviours have always been assumed to be under one's control. According to this assumption, an individual should be able to improve his/her life expectancy by having a more disciplined lifestyle, i.e. abandon/reduce a smoking habit and alcohol consumption. Correspondingly, the effort should allow them to move to a lower risk group and enjoy a reduction in premium.

### **2.3.2. Ethical Issue of Using Gender as a Risk-rating Factor**

Having disproved the evidence supporting the mortality difference between genders, the European Commission proceeded by criticising the ethical issue of using gender as a risk factor. It stated that, even though gender discrimination is

justifiable on statistical grounds, it is generally viewed as ‘morally unacceptable’. The main criticism concerns the *controllability* of the risk factors by consumers. As noted, lifestyle factors (occupation, smoking and nutrition habits etc.) are controllable by consumers to a certain extent. Gender, in contrast, is determined prior to birth, over which individuals have no control. Therefore, taking account of an individual’s gender in the calculation of premiums may be perceived as unfair by consumers.

It is important to stress that moral theory has different schools of thought and usually does not offer a singular approach that is unanimous or close to unanimous. Besides having a thorough understanding of mathematical and statistical theories, it is essential that Actuaries are aware of future ethical challenges on insurance practice. In that regard, every business decision made has to be well-funded and justifiable.

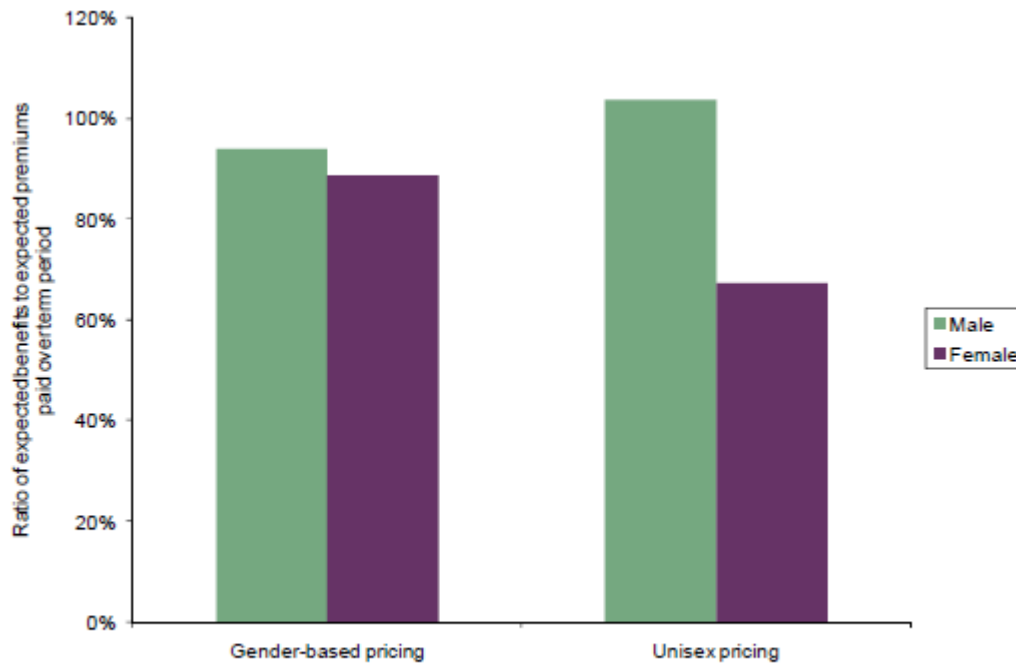
### **2.3.3. Consequentialism and Actuaries’ ‘Group’ Approach towards Equality**

The fundamental question is what makes a decision ‘morally right’. In fact, the debate surrounding the use of gender as a rating factor in determining premiums is, by its very nature, a matter of ‘fairness’. Two renowned philosophical approaches are put forward for the following discussion, namely utilitarianism and deontology.

Utilitarianism, also known as Consequentialism, suggests that an action is considered morally superior if the course of action is the one that *maximises utility* (Bentham, 1781). To put this into context, it means minimising the overall premiums paid by policyholders for the total amount of coverage they have applied for. In other words, keep cross-subsidy to a minimum so that the total benefit will be as close as possible to the total expected claim cost. As mentioned earlier, insurance is a mechanism that involves both risk pooling and classification

to determine an ‘actuarially fair’ premium for men and women separately. This act allows Actuaries to achieve ‘fairness’ on a group level since equal risks are treated equally and there exists no cross-subsidy between the genders.

**Figure 3: Ratio of expected benefits to expected premiums paid for term assurance in Germany (Oxera, 2011)**



Source: Oxera analysis based on data from price comparison websites and the German actuary mortality tables (DAV).

As illustrated in figure 3, by using gender as a risk factor, expected premiums received and expected benefits outgoing for German term assurance match more closely with a gender-based pricing basis than with a unisex basis. This is particularly significant for female consumers. Furthermore, this outcome is consistent with the Utilitarianism view of moral rightness since the overall premiums collected from both men and women combined are lower than those



collected using a unisex basis, which includes a significant margin for adverse selection between genders (see section 3.2).

#### **2.3.4. Deontology and ‘Individualistic’ Approach towards Equality**

Although fairness has been achieved on a group level, Utilitarianism is unable to reach fairness on an individual level. Deontology, in contrast, removes the focus on outcomes and suggests that an act is morally superior if it focuses on an individual’s fundamental rights by treating each person equally regardless of racial, sexual, religious or ethnic differences (Kant, 1785). From a Deontologist’s view, each policyholder has his/her individual rights and therefore they should not be sacrificed (by paying more because of their gender) for the common good of the community, i.e. insurers and consumers of the opposite gender.

Even though the UK insurance industry has adopted a gender-neutral pricing basis, the individualistic approach is by no means superior to the Actuaries’ group approach. To illustrate, during the health insurance reform in the United States during the 1990s, New York was the only state to adopt a ‘pure community rating’ – a mandatory premium rate charge to all individuals regardless of their risk profile, such as age, gender and smoking status (this will be discussed at section 4.2). Because of the mandated community rating, New York now has the highest insurance premium rates of all states. Many have suggested a repeal of the mandated community rating in order to make insurance more affordable for the public (Parente and Bragdon, 2009).

## **Section 3    Impact of Gender-neutral Pricing on the Life Insurance Industry**

Section 2 discussed how insurance premiums are calculated through combining the mechanisms of risk pooling and classification. Gender, as a risk factor, was able to provide a relatively costless, objective and statistically relevant measure during the course of risk classification. As a result, it had allowed insurers to estimate the expected claim cost for each policyholder accurately and price at an ‘actuarially fair’ rate accordingly. Moreover, an improvement in risk identification reduces subsidy aversion by low-risk consumers and prevents adverse selection by high-risk consumers.

This section analyses the impact of the gender directive on the life insurance industry. To start with, an economic model developed by Rothschild and Stiglitz (1976) is examined to make inferences on the potential market outcomes. It then transitions into a more in-depth analysis and investigates the practical issues faced by insurers as well as how they might deal with those issues.

### **3.1. Economic Model of Imperfect Information**

Removal of the risk-rating factor has undoubtedly led to inefficiency in the insurance market. The main focus for this report is to analyse the extent of the inefficiency. This section will examine a canonical model developed by Rothschild and Stiglitz in 1976 to make inferences on possible market outcomes due to imperfect information.

#### **3.1.1. Canonical Model by Rothschild and Stiglitz**

Among all the models developed to address the problem of imperfect information, the most renowned is that developed by Rothschild and Stiglitz (Rothschild and

Stiglitz, 1976). This model attempts to evaluate the effect of asymmetric information on the insurance market, which is applicable in this context since a ban on gender-based pricing will create asymmetric information for insurers in terms of insurance pricing.

The model consists of four assumptions. Firstly, the insurance market is competitive and unregulated and therefore insurers are expected to make zero profit. If profits are made, competitors could develop a more competitive product with lower premium or higher benefits. If losses are made, the loss-making insurers will withdraw from the market. Secondly, the market only consists of two types of consumers – high-risk and low-risk. A high-risk consumer has a higher-than-average chance of illness and thus imposes a higher than expected claim cost for insurers, and vice versa. Thirdly, each insurer treats the actions taken by other competitors as fixed. Consequently, there exists Nash equilibrium in the market because no insurer has an incentive to deviate from its original strategy despite knowing the actions of its competitors. Last, but most important, insurers are unable to identify consumers' risk profiles due to the lack of information/restriction but consumers know perfectly which risk category they belong to.

### **3.1.2. Sub-optimal Market Response: Separating Equilibrium**

The model is able to determine two market equilibria: pooling equilibrium and separating (no cross-subsidy) equilibrium. On rare occasions, there may not be any equilibrium at all. *Pooling equilibrium* is considered as the optimal market outcome in which both groups (high-risk and low-risk) of customers purchase the same insurance contract, forming a common insurance pool. However, the authors have immediately proved that a pooling equilibrium cannot exist. Since both risk groups are purchasing the same contract, low-risk customers are effectively

overpaying for their policy compared to a ‘low-risk only’ policy that charges a lower premium. A competitor could offer an alternative policy with a more competitive rate but with less coverage, to attract all the low-risk customers. As low-risk policyholders are withdrawing from the risk pool, it leaves an increasing proportion of high-risk policyholders in the remaining risk pool. As a result, the business can no longer be sustained at the initial premium as it is not equal to the average expected claim cost of the risk pool; hence there is no pooling equilibrium.

*Separating (no cross-subsidy) equilibrium* is an alternative market outcome to pooling equilibrium and is considered a sub-optimal market outcome. Since it is impossible to charge high-risk and low-risk consumers at the same rate, insurers could instead identify consumers’ risk profiles indirectly through offering them separate contracts and allowing them to self-select according to their needs. High-risk customers are offered a policy with full coverage, priced at a ‘higher-risk only’ rate. Similarly, low-risk customers are offered partial coverage, priced at a lower rate. This market response is known as a separating equilibrium with no cross-subsidy between the risk groups.

### **3.1.3. Implications for the UK Life Insurance Market**

Implementation of the model following the ruling will have multiple implications for the life insurance market. Firstly, the non-existence of pooling equilibrium leads to the discussion of pricing risk and inclusion of a gender mix risk margin in section 3.2. Secondly, it is suggested that a separating equilibrium cannot be reached unless low-risk (or ‘good’ risk) customers cannot buy any insurance at all or cannot buy as much as they intended at the new rate. More importantly, through offering the ‘right menu’ to consumers for self-selection, premiums charged are effectively risk-rated. This leads to the discussion of change in

product design and targeted marketing by insurers in section 3.3. Thirdly, it is important to emphasise that in the cases of both pooling and separating equilibrium, the total number of individuals with insurance policies is unchanged, i.e. no policyholder exits the market.

Apart from separating equilibrium, another possible market response is the non-existence of market equilibrium. This occurs if the lower coverage policies that are necessary for a separating equilibrium are unavailable due to, for example, compulsory benefits (Buchmueller and DiNardo, 2002), which will be likely to cause low-risk policyholders to exit the market. This leads to the discussion of an adverse selection ‘spiral’ where the market experiences a vicious cycle of increased premiums and a shrink in market size (this will be discussed in section 4). Despite the simplicity of the model, the insight gained is invaluable. In practice, the issues that arise are more complex than suggested. For instance, Hoy (2005) argued that the restriction on individual choice, such as compulsory insurance regulation, may not be suitable in a real world setting.

### **3.2. Pricing Risk during Transitional Phase**

A recent survey on UK and Irish insurers conducted in November 2013 (11 months after the implementation of the directive) listed their concerns prior to the ruling (Gerrard and Dheir, 2013). The majority of the insurers expressed that their biggest concern was the gender mix risk of their portfolios. Under the gender-neutral pricing basis, the unisex premium is expected to settle between male and female pre-gender ruling rates. According to the R-S (shorthand expression for Rothschild and Stiglitz) model’s ‘no pooling equilibrium’ result, there will surely be cross-subsidy between both genders. As a result, the lower-risk gender is expected to experience an increase in premium rates while the higher-risk gender is expected to benefit from a reduction in premium rates. However, in practice,

the higher-risk gender might not benefit from the unisex pricing basis due to the inclusion of the gender mix risk margin by insurers.

### 3.2.1. Cross-subsidy and Illustration of ‘Fair’ Pricing under the Gender-neutral Pricing Basis

This report focuses on the ruling’s impact on term assurance policies. Term assurance provides financial protection to policyholders’ beneficiaries, i.e. parents, spouses, siblings and children, in the event of death of the policyholder. The following section illustrates the fair pricing under unisex pricing basis which consists of two companies with the same charging structure prior to the ruling but with different gender compositions in their insurance portfolio.

**Table 2: Expected change in premium rates for males and females for term assurance policies** (Gerrard and Dheir, 2013)

Company		Premium - Dec 2012 (pre gender ruling) <sup>1</sup>	Gender mix	Weighted Average Premium	Unisex Premium with Risk Margin	% Change
A	Male	£10.67	40%	£9.69	£9.69 - £10.67	0-9% reduction
	Female	£9.03	60%			7-18% increase
B	Male	£10.67	60%	£10.01	£10.01 - £10.67	0-6% reduction
	Female	£9.03	40%			10-18% increase

Note: Premium rates used are the average premiums of the five cheapest providers. A 25 year term assurance with a sum assured of £160,000 for a non-smoking individual aged 35

Ignoring any exogenous factors (such as reaction of competitors and consumers), the starting point of the calculation of unisex premiums should be based on the initial gender mix of the insurer’s portfolio, i.e. the weighted average between

<sup>1</sup> Due to the lack of a term assurance price index in the market, the data used is taken directly from Gerrard and Dheir (2013) which they collected from Moneysupermarket.com

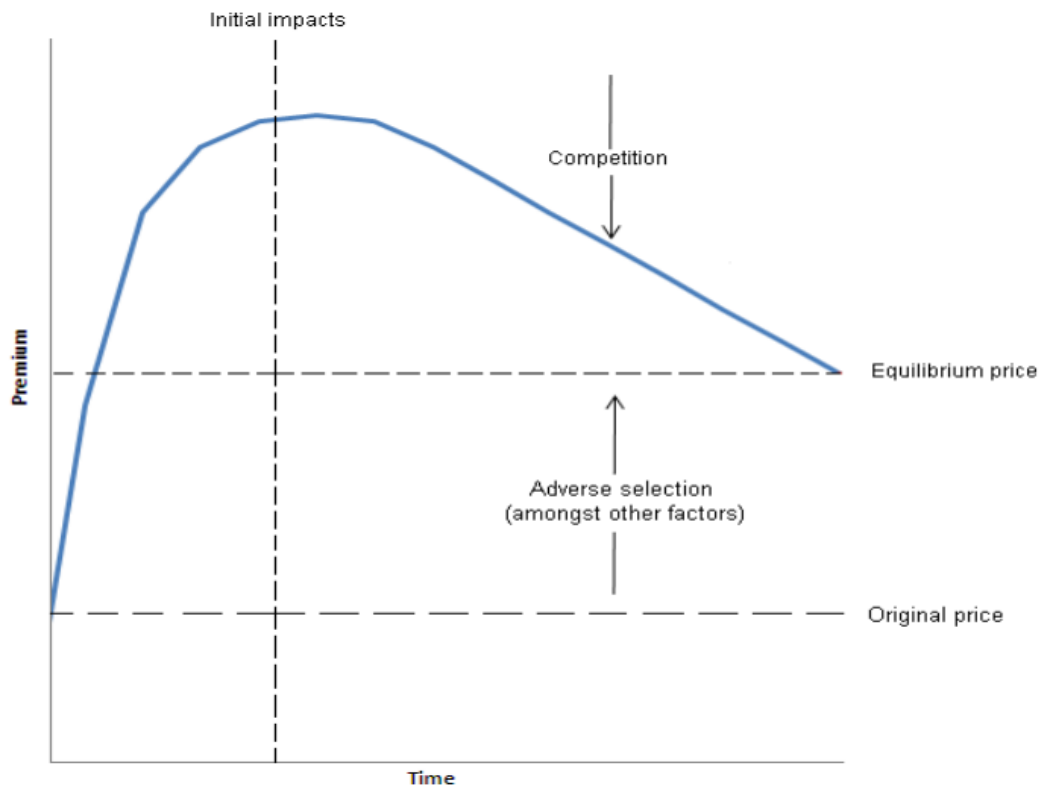
male and female rates (Oxera, 2010). The extent of the level of cross-subsidy depends on the proportion between the two risk groups.

For term assurance business, male policyholders effectively become more costly to the insurer since men generally have a higher mortality rate than women. For company B, the higher-risk group (male) represents a larger proportion in its portfolio and therefore it experiences a higher level of cross-subsidy, i.e. the lower-risk group (female) pays significantly more than that in company A. From an actuarial perspective, the weighted average premium (£9.69 and £10.01) is fairly priced as premiums received will be equal to expected claim costs. However, this is only appropriate if the ongoing gender mix of the portfolio does not change in the future.

### **3.2.2. Inclusion of Portfolio Mix Risk Margin**

Figure 4 below shows the HM Treasury's prediction on the market response to the ruling. It has predicted that the initial unisex premium would rise substantially during the transitional phase. In the long run, the premium is expected to adjust downwards and stabilise at a long-term equilibrium.

**Figure 4: Expected market adjustments in response to the implementation of gender directive (HM Treasury, 2011)**



The reason for the short-term surge in premiums is due to the excess inclusion of a portfolio mix risk margin on top of the initial ‘actuarially fair’ premium which aims to protect insurers against uncertainty in their gender profile. As suggested by the Institute and Faculty of Actuaries (2012), it would be difficult for insurers to predict the gender mix of their portfolio especially during the transitional phase, given that market reaction is unpredictable. Therefore, it would be reasonable and prudent to assume that the future gender mix of the portfolio will not remain the same and that precautions are needed.

Considering the term assurance example again, after the initial actuarially fair unisex premiums are calculated, the immediate concern for both company A and



company B is whether their portfolios would attract a higher-than-expected proportion of male consumers. If premiums charged are too low for the future gender portfolio, the insurer would suffer from a significant loss from this initial pricing risk. In addition, insurers are exposed to the potential of adverse selection arising as a result of the inaccurate pricing. The theoretical unisex premium in the short-run is calculated in table 2 and the range has been determined. With the lower bound being the weighted average premium rate with constant gender profile assumption and the upper bound being the premium with the maximum risk margin applied equivalent to male rates representing the worst case scenario, all future policies will be sold to male consumers.

In general, the safest strategy would be choosing the male rate as the unisex premium. This would eliminate any risk arising from future gender mixes and therefore insurance loss could be prevented. However, insurers are likely to suffer from a drop in sales because the level of cross-subsidy may discourage female consumers from buying the product. Unless gender risk is entirely eliminated via the imposing of a maximum margin, additional capital will have to be set aside due to the fact that risks are less predictable when not using gender and that market reaction is unpredictable. Nevertheless, the level of margin would vary between insurers, not only because of different perceptions of the risk but also because of differences in marketing approaches that provide insurers with a predictive gender mix in the future.

**Table 3: Term assurance premium rate before and after the implementation of the gender directive for men and women (Gerrard and Dheir, 2013)**

	Premium - Dec 2012 (pre Gender Directive)	Premium - Jan 2013 <sup>2</sup> (post gender directive)
Male	£10.67	£11.32 (+6%)
Female	£9.03	£11.32 (+25%)

Note: Premium rates used are the average premiums of the five cheapest providers. A 25 year term assurance with a sum assured of £160,000 for a non-smoking individual aged 35

Table 3 shows that the actual average premium increased beyond the male premium rate (£11.32) prior to the gender ruling. This is because, in addition to the gender mix risk margin, insurers are passing transition costs, such as the cost of updating/amending existing business, system change and compliance checks, on to consumers. In the long run, the price fluctuation is expected to stabilise as insurers gather more information about the market, on which to make statistical inferences (Experian, 2012). There is a consistent downward pressure on market premiums, driven by competition (frequent re-pricing by insurers). The long-term equilibrium is believed to be the weighted average rates between overall male and female policyholders in the market. To date (26/7/2014), the average premium has settled at £10.45<sup>3</sup> which is consistent with the original prediction.

### 3.3 Moving Forward: How Insurers Adapt to Change

This inclusion of the gender mix risk margin on top of the initial unisex premium aims to protect insurers against uncertainty in gender composition. However,

<sup>2</sup> Again, due to the lack of a term assurance price index in the market, the data used is taken directly from Gerrard and Dheir (2013) which they collected from Moneysupermarket.com

<sup>3</sup> Moneysupermarket.com. Premium rates used is the average premium of 5 cheapest providers. A 25-year term assurance with sum assured £160,000 for an non-smoking individual aged 35

including an excessive risk margin might make the product unattractive and thus lead to mass policy withdrawal. Instead of managing the gender mix risk through an increase in premium, insurers could take alternative approaches. For instance, they could adjust their product design and improve their risk classification system.

### **3.3.1. Change in Product Design and the Use of Targeted Marketing**

The inclusion of a gender mix risk margin would undoubtedly lead to deterioration in the demand for insurance. The initial 'actuarially fair' unisex premium is appropriate only if the demand falls uniformly across both risk groups. As demonstrated in the calculation of the initial actuarially fair unisex premium, there will be a cross-subsidy from low-risk to high-risk groups. Crucially, this cross-subsidy has created an incentive for adverse selection. In addition, the existence of price comparison websites will magnify the impact of adverse selection, as high-risk consumers are able to immediately and easily identify policies with cheaper premiums and take financial advantage of the policies. This will be particularly significant for standard products such as term assurance and annuities.

The correlation between demand for insurance and individual risk level constitutes the essence of adverse selection. Loss caused by adverse selection is positive if the male consumers intentionally demand more insurance, since males tend to have poorer health which imposes higher costs for their insurers. Supposing the correlation of risk and demand for insurance is indeed positive. De Jong and Ferris (2006) have offered a mathematical expression of the adverse selection loss and strategy to mitigate the loss.

$$\text{COV}(r_g, \mu_g) = \sigma_r \sigma \rho$$

Where

- $r$  denotes the demand for insurance, in terms of the amount of coverage and rates of uptake
- $g$  denotes the information set for predicting the expected claim cost  $\mu_g$ ; that is, all risk factors excluding gender
- $\mu_g$  is the expected claim cost for an individual with risk  $g$ , given 
$$\mu_g = E(X|g)$$
- $\sigma_r$  and  $\sigma$  are the standard deviations of  $r_g$  and  $\mu_g$  respectively;  $\rho$  represents the correlation between both variables

*Limiting the variance of insurance demand  $\sigma_r$*  – Insurers could opt not to accept policies with a large sum assured or could set limits on the maximum amount an individual is able to purchase.

*Limiting the variance of an individual's expected claim cost  $\sigma$*  – For a unit of unisex premium, expected claim costs can be minimised by attracting the lower-risk gender as much as possible. This can be achieved through targeted marketing to reduce heterogeneity in policyholders. Insurers could target specific occupations (Curry and O'Connell, 2004); for instance, a higher proportion of female consumers are expected to be found among nurses.

*Limiting the correlation between sum assured and expected claim cost* – Impose product restrictions, such as a standard sum assured, which limits consumer choice. This is similar to the idea of group term assurance where the amount of sum assured is defined by a formula based on the group's demographics.

The mathematical approach offered above aims to reduce loss by preventing ‘bad risks’ from purchasing insurance. Nevertheless, from an actuarial perspective, ‘bad risks’ are not necessarily bad as long as insurers charge adequately. This is possible if insurers were able to gain a more predictable gender mix through their marketing approach.

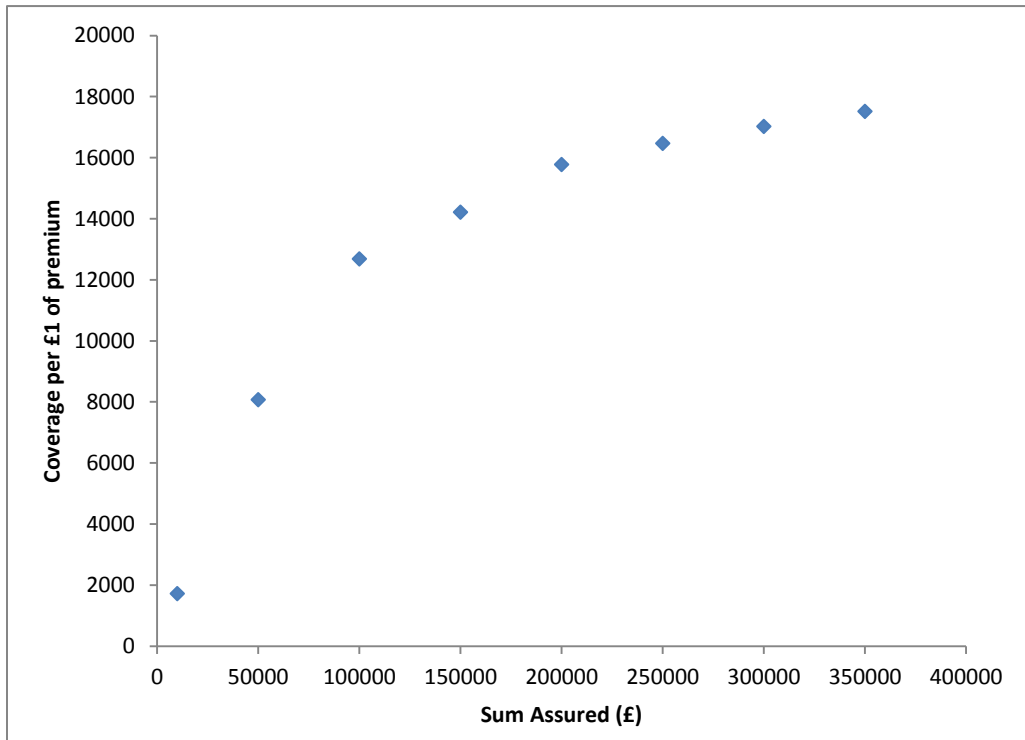
Targeted marketing aims to pick up gender difference on other risk factor. Gunn and Coverson (2002) suggest that insurers are including gender-specific critical illness cover to target consumers of a specific gender. For example, the inclusion of breast and ovarian cancer cover would tend to attract female customers and correspondingly testicular cancer cover would attract a higher proportion of male customers. Alternatively, insurers can increase the proportion of short-term products with renewable options or non-guaranteed benefits, i.e. with-profit or investment linked, which involve a certain degree of risk sharing if the actual experience (business mix) is worse than expected. In addition, there is an increasing trend towards business with reviewable premiums.

### **3.3.2. Increase Weight Assigned to Current Factors**

The main purpose of targeted marketing is to bias the gender mix of portfolio and hence reduce the heterogeneity of policyholders within a class of business. This is consistent with the R-S’s separating equilibrium in terms of offering the ‘right menu’ for consumers to self-select. In fact, the same result can be achieved via an improved risk classification system. The change in product design allows insurers to gain a more predictable gender mix by appealing to a particular risk group, although they might miss out on general market share. In the long run, it would be sensible for insurers to modify their risk classification system. The risk classification system could be improved by an increase in the weight assigned to other risk factors (age, occupation and smoking status).

In terms of increasing the weight assigned to current risk factors, this is usually done by using the generalised linear model (Anderson et al., 2007). Again, supposing the correlation of risk and demand for insurance is indeed positive, it may be appropriate for insurers to increase the weight assigned to the amount of sum assured. Instead of applying a risk margin uniformly across all policies, insurers could impose a higher risk margin on contracts with a higher-than-average sum assured (De Jong and Ferris, 2006). In theory, this should be an effective way to mitigate losses caused by adverse selection. Nevertheless, policyholders could ‘by-pass’ this system via holding multiple contracts simultaneously. In this circumstance, insurers could apply a stricter underwriting process, such as financial underwriting or requiring applicants to disclose their policies with other insurers.

**Figure 5: Relationship between sum assured and coverage per £1 of premium**  
(MoneySupermarket, 2014)



Note : Premium rates used is the average premium of the five cheapest providers. A five year term assurance for a non-smoking individual aged 40

If male policyholders do indeed intentionally purchase higher amounts of coverage under the unisex pricing system, a curve with a negative or flat slope will be observed. However, the data retrieved from the price comparison website implies that there is a negative correlation between an individual's risk and coverage. For policies with a large sum assured, insurers are more likely to offer a discount. In fact, this negative relationship has been widely observed across different life insurance markets (Cohen and Siegelman, 2009) (this will be discussed in section 4.1).

### **3.3.3. Search for New Risk Factors and the Potential of Indirect Discrimination**

In addition to varying the weight assigned to other risk factors, the risk classification system can be improved by adding new risk factors that are cost-effective, to increase insurers' ability to determine an individual's expected claim cost. For instance, the body mass index (BMI) is a new factor that has been increasingly used by life insurance companies. Exploring new risk factors may allow insurers to be more accurate in their predictions. However, some may constitute indirect discrimination. For example, the use of shoe size as a risk factor may be correlated with gender but it has no correlation to the underlying risk (mortality, morbidity and longevity) (Oxera, 2010) whereas BMI is correlated with gender and at the same time indicates the possibility of the individual suffering from a weight related medical condition.

The UK, France and the Netherlands have adopted the 'close-ended system of justification' in which both direct and indirect discrimination is unconditionally prohibited, with specific exceptions stated by the authority (Thiery and Van Schoubroeck, 2006). This is in contrast to the 'open-ended system of justification' that is currently adopted in Belgium which allows for the concept of discrimination to evolve.



## **Section 4 Analysis of Adverse Selection Post-Gender-Ruling and Future Outlook in the UK**

The existence of adverse selection has the potential to damage the financial stability of insurers. A positive demand-risk relationship will cause insurers to suffer from losses. Nevertheless, through analysing the relationship between coverage and coverage per premium in section 3.2.2, it has been observed that insurers charge proportionately less when insurance coverage increases. This indicates that demand for insurance (here, in terms of coverage) is negatively correlated to an individual's risk level. In other words, male policyholders did not intentionally purchase more under the unisex pricing system.

In this section, this report examines the adverse selection hypothesis; that is, the higher-risk gender intentionally takes financial advantage of the unisex pricing system by demanding more insurance than they would prior to the ruling. It begins by analysing factors that influence the demand-risk relationship and the extent of adverse selection observed in the UK term assurance market will be presented accordingly. Furthermore, there is speculation that a ban on using age as a risk-rating factor might occur in the future since the EU is currently working on an age and disability directive. This report reviews the experience of New York's 'pure community rating' to make inferences on the UK market's ability to tolerate such a ruling.

### **4.1. Factors Influencing Adverse Selection and the Extent of Adverse Selection in the UK**

Demand for insurance can be divided into two components, that is the rate of insurance uptake and the amount of coverage bought. The following section

analyses the elements that influence adverse selection and the extent of adverse selection in the UK term assurance market.

#### **4.1.1. Rate of Insurance Uptake: Elasticity of Demand**

Thiery and Schoubroeck (2006) suggest that adverse selection by rate of insurance uptake will not occur if the demand for insurance is inelastic. Inelastic demand indicates that consumers are insensitive to price changes in the market. This could be due to the fact that there exists a lack of substitutes to replace the product, that uptake of the insurance is compulsory or that the product is regarded as a necessity by the society. In extreme cases, a perfectly inelastic demand would guarantee the non-existence of adverse selection as the demand for insurance is always the same regardless of any changes in price.

An example that closely matches this description would be a third-party motor insurance which is compulsory by legislation. It was predicted that the overall market of third-party motor insurance would be likely to experience minimal impact amongst all types of insurance. At worst, young female drivers will delay their purchase of a car, and hence enrolment for motor insurance, which will not affect the overall gender composition in the long run (Oxera 2010).

Elasticity of demand varies across different products. For term assurance, despite it being non-compulsory to purchase the product, there are currently no alternatives in the market which serve the same purpose; thus the overall impact of the gender ruling on the term assurance market is expected to be trivial, i.e. the market demand for term assurance is considered to be inelastic. In practice, the elasticity of demand of the market cannot be identified easily. Some industry specialists suggest that the market would experience a mild adverse selection by insurance uptake since price is commonly regarded as one of the main

determinants for purchasing term assurance (Institute and Faculty of Actuaries, 2012).

According to Gerrard and Dheir (2013), it has been observed that there is an increasing trend of male consumers enrolling for term assurance. Some 67% of insurers experienced higher-than-expected male lives in their portfolio during the month after the implementation of the gender directive. In June 2013, the proportion had increased to 80%. Undoubtedly, an adverse selection by insurance uptake has been observed in the UK term assurance market after the initial implementation of the gender directive. On the other hand, as far as pension annuities are concerned, there is a general consensus that the impact of adverse selection would be quite severe, particularly after the abolishment of compulsory annuitisation in the recent budget announcement in May 2014 (Blake, Cannon and Tonks, 2010). This has changed the elasticity of the annuity market's demand from inelastic to elastic.

#### **4.1.2. Risk-coverage Relationship: Active and Passive Adverse Selection**

The analysis above examines the factors that cause adverse selection by rate of insurance uptake and has determined that it is influenced mainly by product nature, legislation and public attitude towards the particular product. On the other hand, adverse selection by amount of insurance coverage bought is influenced by numerous factors. It has been widely believed that an individual's demand for insurance coverage is positively correlated to his/her risk profile and this section investigates whether the hypothesis is true.

In fact, adverse selection by amount of coverage bought can be divided into two categories, namely 'active' adverse selection and 'passive' adverse selection (Pauly et al., 2003). Active adverse selection indicates that high-risk consumers deliberately purchase additional insurance coverage to take advantage of a

reduction in premium rates. This proposition is based on the assumption that individuals are *utility maximisers*.

Passive adverse selection, however, suggests that an individual's demand for insurance coverage is determined by a function that consists of many factors. Some factors are positively correlated to the individual's risk level while others are negatively correlated. Depending on the weighting to each factor, the overall risk-coverage correlation can be either positive or negative. For instance, a factor such as number of dependents of the policyholder is positively correlated to the amount of coverage bought by the policyholder. Among all the factors, this report has chosen some of the key factors that are more controversial for discussion, as listed below.

Self-perceived state of health – it is sensible to purchase additional term assurance if an individual believes he/she is in a poor state of health. Nevertheless, the crucial assumption depends on an individuals' ability to predict their actual risk of death, i.e. the correlation between self-perceived risk and the individual's true underlying risk. McGarry and Finkelstein (2003) have found that an individual's belief of his/her riskiness is positively correlated to their true underlying risk. In their analysis, individuals who think they are in a poor state of health tend to purchase additional insurance coverage and the relationship between insurance coverage and risk occurrence is positively correlated and statistically significant.

Nevertheless, the possession of private information does not necessarily imply a more accurate forecast by consumers. Cohen and Siegelman (2009) argue that individuals with private information on risk factors that affect their risk profiles normally are not able to utilise this information in their self-assessment of riskiness. In light of the lack of expertise by consumers, Meehl (1954) has performed an analysis to compare the accuracy of the prediction of an individual's

actual risk of death between clinicians and a simple statistical model. In his analysis, clinicians certainly have an information advantage over the insurers, such as the ability to ask specific health questions and examine body parts if needed. The analysis has concluded that the statistical model significantly outperformed the clinician's prediction.

Level of income – as shown in figure 5 in section 3.3.3, insurers tend to offer discounts as the amount of sum assured increases. It implies that a consumer who purchases a higher amount of coverage has a lower tendency to make a claim in practice. One of the hypotheses is that the amount of coverage represents the present value of the consumer's future earnings. For instance, an individual with a high income would be likely to choose high term assurance coverage to maintain his/her family's living standard. Also, it has been widely suggested that financially sophisticated individuals tend to have lower mortality. In Australia, there are schemes specifically targeting high-income individuals, such as members of professional bodies (accountants, lawyers, doctors etc.), as their mortality rate tends to be negatively correlated to level of income (De Jong and Ferris, 2006).

Level of risk aversion – it has been suggested that insurance is most attractive to risk-averse individuals. As mentioned in section 2.1, the insurance mechanism relies on the assumption that individuals are risk-averse. Greater risk-aversion makes a unit of insurance coverage more valuable for the individual in utility terms (Hemenway, 1990). Furthermore, a risk-averse person is more likely to have a lower mortality rate than the average person since they are less likely to engage in activities or habits that increase the chances of ill-health or death, such as smoking, excess alcohol intake and drug abuse.

The negative risk-coverage correlation that has been observed in the UK term assurance market suggests that those consumers who purchased additional insurance coverage are mainly influenced by factors, such as level of income and level of risk aversion, but not because their gender, i.e. they are males (as suggested by the theory of active adverse selection).

#### **4.2. Industry Future Outlook on the Ban of Using Age as a Risk Factor and the Industry's Fear of the Occurrence of Adverse Selection 'Spiral'**

Currently, there is speculation that the ban on using age as a risk-rating factor may happen in the future since the EU is currently working on an age and disability directive and has planned to include derogation similar to that in the gender directive (Kay et al., 2012).

As demonstrated in section 3, a ban on the use of gender as a risk factor will impose external costs for consumers with 'better risks'. In theory, a ban on age will make term assurance more attractive to older-age consumers. Depending on an individual's level of risk aversion, it would be logical to assume that some will exit the insurance pool in response to the ruling. This leaves behind a pool with an increased proportion of older-age policyholders (or bad risks). In order to cover for the expected increase in cost, a higher premium rate has to be charged on the remaining members. However, this will cause further low-risk policyholders to withdraw leading to a vicious cycle of premium increases and shrinkage in market size. This phenomenon is often referred to as the adverse selection 'death spiral'. However, some have suggested that the effect of the adverse selection spiral is sometimes exaggerated (Viswanathan et al., 2007).

As mentioned earlier, an individual's age is by far the most important factor in determining risk profile (Brown et al., 2004). The industry fears that this potential ruling will lead to an adverse selection 'spiral' (Thomasson, 2002) (Siegelman,

2003). Given that there are insufficient international experiences on which to make inferences on the ruling's impact on the term assurance market, this report has chosen to review the health insurance reform in New York during the 1990s.

#### **4.2.1. Case Study: Community Rating in New York During the 1990s**

In the early 1990s, the United States implemented a major healthcare reform which aimed to promote the use of health insurance. Among all the states, New York was the only one to adopt a 'pure community rating' – a mandatory premium rate charges for all individuals regardless of their risk profile (such as age, gender and smoking status). Buchmueller and Dinardo (2002) have examined the effect of the community rating on the New York health insurance market after the reform. The effect of adverse selection spiral is measured via observing three aspects: the total number of people with health insurance policies, the age distribution of those receiving coverage and changes in the nature of coverage (i.e. policy design).

The analysis has observed a significant increase in the proportion of older age policyholders. Also, the implementation has caused a significant impact on the structure of the insurance market. It has been observed that there was a dramatic shift from indemnity to Health Maintenance Organization (HMO) which is considered to be unattractive to high-risk customers since it limits the policyholder's choice of physicians and treatments. More importantly, it has been observed that there is no increase in the total number of people covered by insurance.

The study concludes that the imposition of a pure community rating leads to adverse selection – an increase in premiums as well as an older age policyholder proportion. Nonetheless, there is no evidence for the dire prediction of adverse selection 'spiral' since the overall number of individuals with insurance policies

has not changed. However, the unchanged proportion of insured population also implies that implementation of the pure community rating has failed to promote the use of health insurance.

#### **4.2.2. Inference on the UK Life Insurance Industry and Industry Outlook on Further Policy Intervention**

The imposition of a pure community rating has led to an increase in premiums as well as the proportion of older-age policyholders. However, the overall number of persons covered by health insurance did not shrink. Since the introduction of community rating in New York did not cause an adverse selection spiral, this suggests that the ban on using age as a risk rating factor may be viable in the UK insurance market in the future. According to the experience in New York, the age and disability ruling is likely to cause disruption to the UK life insurance market in the short term but the market will eventually reach a ‘separating equilibrium’ as insurers adjust their policy design and pricing structure.

The only community-rated insurance to exist in the EU can be seen in the health insurance industry of Ireland and the Netherlands. Nevertheless, specialists have warned that the inability to use age and disability as rating factors would impose a far greater threat to the life insurance market than the health insurance market (Kay et al., 2012). As noted previously, due to the mandated community rating, New York now has the highest insurance premium rates among all states and many have suggested repealing the mandated community rating to make insurance more affordable for the public.



## **Section 5 Conclusion**

The main principle of insurance requires that the premium charge to the consumer reflects his/her profile. As suggested by numerous researchers in the literature, an individual's age is by far the most important factor in determining risk profile. Next to age, gender is arguably the second-most significant factor. Since men have higher mortality than women, because of genetic and behavioural differences, insurance companies charge different premiums to men and women based on their gender. Due to market pressure, insurers will always have the incentive to identify a consumer's risk profile as accurately as possible to keep their premiums competitive. This can be achieved by choosing risk-rating factors that are cost-effective for the risk assessment process, e.g. easy to identify, hard to manipulate and statistically relevant to the likelihood of death. Gender as a risk-rating factor has excelled in all these criteria.

The implementation of gender-neutral pricing means that unequal risk profiles, namely that of men and women, are forced into the same risk group. In order to make inferences on potential market responses, this report has examined the adverse selection model developed by Rothschild and Stiglitz (1976). Despite the simplicity of the model, its result has led to a more in-depth discussion, including the pricing risk faced by insurers, change in product design and modifications to the risk classification system.

This report focuses on the ruling's impact on term assurance and has determined that initial actuarially fair unisex premiums should be based on the weighted average of male and female premiums before the ruling. Nevertheless, an immediate concern for insurers is whether their business would attract a higher-than-expected proportion of male consumers in the future. This has led to the

inclusion of a gender mix risk margin on top of the initial actuarially fair unisex premium to protect against uncertainty in gender composition.

Furthermore, instead of managing the gender mix risk through an increase in premium, insurers could take an active approach to gain a more predictable gender mix via the use of targeted marketing. The implementation of gender-neutral pricing has compelled insurers to modify their risk classification system through increasing the weight assigned to other risk factors – this report has suggested increasing the weight assigned to sum assured. At the same time, insurers are actively searching for new risk factors to replace gender as a risk factor. Exploring new risk factors may allow insurers to be more accurate in their predictions but some of these may constitute indirect discrimination. This report has suggested that it is essential that the new risk factor is correlated not just to gender, but also to the underlying risk.

In addition, this report has performed an analysis of adverse selection. Adverse selection means that the higher-risk gender intentionally demand more insurance under the unisex pricing system; a positive correlation between an individual's risk profile and demand for insurance constitutes adverse selection. This report has examined the factors that cause adverse selection and the extent of adverse selection that has been observed in the UK so far.

Demand for insurance can be broken down into two components, that is the rate of insurance uptake and the amount of insurance coverage bought. Adverse selection by rate of insurance uptake is determined by the elasticity of demand which is influenced mainly by product nature, regulation and the public's attitude towards the product. On the other hand, the demand for insurance coverage is determined by a function that consists of many factors. Some factors are positively correlated to the demand of insurance coverage while others are

negatively correlated. Depending on the weighting to each factor, the overall risk-coverage correlation can be either positive or negative. Among all the factors, this report has chosen some of the key factors that are more controversial for discussion, i.e. self-perceived state of health, level of risk aversion and level of income.

Furthermore, there is speculation that the ban on using age as a risk-rating factor may happen in the future since the EU is currently working on an age and disability directive. As noted, an individual's age is by far the most important factor in determining risk profile. The industry fears that this potential ruling will lead to a vicious cycle of increase in premium and a shrink in market size, also known as adverse selection 'spiral'. In theory, a ban on age will make term assurance more attractive to older-age consumers. In order to cover the increased proportion of older-age policyholders, insurers must increase the premium to cover the potential loss. However, this act will cause some of the young-age policyholders to withdraw, leaving behind a higher-proportion of old-age policyholders, and so the process continues to repeat itself.

Given that there are insufficient international experiences to make inferences in relation to the impact on the life insurance market, this report has chosen to review the health insurance reform in New York during the 1990s. Among all the states, New York was the only state to adopt a 'pure community rating' – a premium charge to all individuals regardless of their risk profile, e.g. age, gender and so on. The imposition of the pure community rating has led to an increase in premiums as well as the proportion of older-age policyholders. Nonetheless, the overall number of persons covered by health insurance did not shrink. This suggests that the UK insurance market may be able to tolerate additional policy intervention by the government.

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