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A COMPARISON OF "FAIRNESS" IN INSURANCE UNDERWRITING IN JAPAN AND THE U.S.

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LIST OF ABBREVIATIONS

ABI	Association of British Insurers
GAIC	Genetics and Insurance Committee
GINA	Genetic Information Nondiscrimination Act
HGC	Human Genetics Commission
NHS	National Health Services

Abstract

Insurers need to be careful about responding to pressures to exclude underwriting criteria that could be considered discriminatory. This is because these types of exclusions could have unintended consequences, which may 1) cause some insurers to limit or exit markets where risks and costs have become too high, and/or 2) leave consumers worse off than before. It should also be stressed that there is no global one-size-fits-all solution. Cultural norms and legal requirements can lead to very different country-specific treatments of the criteria in insurance underwriting, as seen in the Japanese and U.S. markets.

Introduction

There has been a worldwide trend to require insurance companies to limit the type and amount of information they can access in insurance underwriting, including genetic testing. This paper is to sound the alarm concerning these changes in insurance underwriting.

Initially, this paper examines which risk categories have been or are currently considered “discriminatory” in the underwriting of health and life insurance, focusing primarily on Japanese and U.S. insurance practices. Whether a category is considered “discriminatory” or not is influenced mainly by the country’s social, historical, and cultural context. In addition, the extent to which individual risk is reflected in premium rates is a consideration. For example, managing fairness in underwriting indicates societal views concerning insurance.

The environment and social systems surrounding health care are one area in which there are marked differences between Japan and the United States. Additionally, the role of private insurance companies in both countries concerning the medical health care system is quite different. By exploring the social backgrounds that give rise to these differences, it is possible to understand how the Japanese and U.S. people have different perspectives on insurance. These differences can impact consumers' expectations and their willingness to assume risk and pay higher insurance premiums.

Problems Involved in Underwriting

Insurance principle and market failure

To better understand how eliminating formerly accepted risk criteria from underwriting can negatively impact the insurance industry and ultimately, consumers, it is first necessary to understand the insurance principle.

The "insurance principle" requires policyholders to pay premiums based on individual risks based on actuarial fairness. Under the insurance principle, premiums are higher when risk is high and reduced when risk is lower. For example, a premium increase for applicants in risky occupations in life insurance is considered reasonable and fair under the insurance principle. However, there may be a divergence between consumers and insurers on the concept of fairness, since consumers do not necessarily understand how insurers cover their costs under the insurance principle.

The term "information asymmetry" is an economic term that usually implies that financial institutions have information, knowledge, and high bargaining power, leaving consumers in a vulnerable position. However, it is used in the opposite sense when purchasing insurance. In other words, the consumer has detailed information about their health and the health of family members and relatives, but the insurance company does not.

In general, the higher the applicant's risk level in the insurance system, the greater the applicant's opportunity for coverage benefits. If a policy is available under standard conditions, the greater the profit for the applicant, so there is a greater tendency for high-risk individuals to consciously or unconsciously purchase insurance or increase policy amounts. This is called "adverse selection" and puts pressure on insurers unable to enroll many low-risk applicants to offset costs.

If risks are not appropriately and sufficiently classified due to the existence of information asymmetry, the impact of adverse selection may become significant. However, from the consumer's perspective, adverse selection is considered an economically rational behavior since the inducement to buy insurance does not work unless the personal risk level is somewhat high. For example, those who have many relatives with cancer may decide to buy cancer insurance, or they may choose to expand their coverage to obtain solid coverage. Another typical example of adverse selection is that a more significant proportion of earthquake insurance is purchased in areas considered to have a higher risk of earthquakes.

On the other hand, "cream-skimming" occurs when insurers only undertake good risks through excessive risk segmentation. Both adverse selection and cream-skimming lead to market failure.

Significance of underwriting

To avoid the negative effects of adverse selection, insurers measure and evaluate the magnitude of the risk associated with the application and determine whether or not to accept the contract and its terms and conditions when entering into an insurance contract. This process is called "underwriting" and is the foundation for stable insurance management.

Since the birth of the modern life insurance industry in England in the 18th century, underwriting has been implemented to prevent adverse selection. Medical examinations were introduced from the 19th century onward. There are various levels of medical examinations, depending on multiple conditions such as policy amount and type of insurance. For medical selection, the method of selection depends on the age, amount of insurance, type of insurance, and physical condition of the insured. In Japan, medical selection is currently centered on the notification of health status, and is broadly classified into three categories: “physician treatment,” “interviewer treatment,” and “notification treatment.”

Possible measures for high-risk individuals when purchasing life insurance, medical insurance, etc. include (1) limiting the amount of insurance (e.g., setting a maximum policy amount), (2) providing insurance products that do not require detailed notification items or medical diagnoses, and (3) setting premium rates and deductibles clauses that are high enough to match the risk.

In recent years, insurers have been making more significant efforts in product development, and insurance products targeting high-risk individuals are on the rise. Examples include medical insurance for the elderly that requires only simple notification items and medical insurance for those who can control their health condition with medications, even under medical treatment. Insurance products have also been developed that target individuals at higher risk, such as HIV-positive people and patients with intractable diseases.

In these cases, the probability of an insured accident is significantly high. But since the accident is fortuitous in some respects ($0 < r < 1$), such as the timing and course of the accident, it can be said that the insurance company has determined that the risk can be handled within the framework of private insurance. As a result, the “availability” of insurance is satisfied, although consumers still face the constraint of “affordability” in whether or not they have the economic capacity to bear insurance premiums. However, while the relaxation of risk categories has social benefits such as expanding coverage and reducing external diseconomies, it can also lead to the denial of the origin and raison d'être of the private insurance system if taken too far.

Fairness and Unfairness in Rate Settings

The Concept of Fairness in Rate Settings

Fairness in underwriting suggests that premiums paid by policyholders should match as closely as possible risk exposure. On the other hand, consumer concepts of fairness are based on the availability and cost of insurance. Many consumers would not think deeply about fairness in premium rates. However, if they are denied coverage or asked to pay higher-than-average premiums, they may view the decision as unfair or discriminatory. In such cases, there may be a divergence between insurers and consumers regarding their views on insurance underwriting.

Also, the concept of "fairness" in setting insurance rates is not immutable and may be judged differently depending on the region or era. Currently, Japan has introduced gender-specific premium rates for many insurance products, including life insurance, annuities, medical insurance, and automobile insurance. However, in some countries, there is a movement to prohibit this as a form of discrimination. For example, the European Court of Justice's March 1, 2011 ruling has deemed gender-based premium rates to be discriminatory. As a result, in EU countries, for new policies concluded after December 21, 2012, the same premium rates for men and women must apply to all types of insurance, including car insurance, life insurance, and annuities. The ban on setting premium rates based on gender in the EU was a notable case. A change in public opinion and value judgments brought about a modification in insurance business practices.

In Japan, gender-segregated premium rates, which employ separate life tables for men and women, were adopted in April 1981 in life insurance practice. The use of gender-segregated premium rates is not that old in insurance history. Therefore, it can be said that in Japan, gender-specific premium rates are not indispensable concerning insurance underwriting. In Japan, gender-based premium rates are usually used for automobile insurance. Still, even in the U.S., where risk segmentation is more advanced than in Japan, some states no longer use gender-based premium rates, despite men, especially young men having higher accident rates than women. This is to address the external diseconomies and social problems associated with the occurrence of uninsured persons. Another reason cited was that gender is a factor outside of the driver's control, unlike accident history, the number of violations, and other factors over which the driver has control.

For example, California has made it illegal to set rates for individual automobile insurance based on gender, effective January 1, 2019. Before California, several states, including Massachusetts, Michigan, Montana, North Carolina, and Pennsylvania, made gender-based rates illegal for individual automobile insurance.

In addition, the information used for risk classification varies from country to country. For example, personal credit information is sometimes used for life insurance risk classification in the U.S. but not in Japan. Also, school grades and car color are sometimes used for risk classification in individual automobile insurance in the U.S. but not in Japan. In the U.S., family medical history is considered by states and insurance types, but not in Japan; until 1974, Japanese insurance notification forms included a family medical history section for biological parents, biological children, and spouses. However, currently, this information is not collected due to self-regulation by the industry. The differences in culture, attitudes, and values in the respective societies of Japan and the U.S. are thought to influence these differences in underwriting practices between the two countries.

Irrationality in risk classification

Health risks arise from genetic and/or environmental factors, with some diseases primarily genetic, others environmental principally, and may be affected by both (see Figure 1). Environmental factors include work, diet, lifestyle, smoking, alcohol consumption, etc. The involvement of these two elements in the onset of a disease may be structured in various ways, but those in which genetic factors play a predominant role are hereditary (genetic) diseases.

The single-gene disorder is caused by abnormality in a single gene, making the cause-and-effect relationship between gene mutation and disease onset relatively straightforward. For example, any person with a negative genetic testing result for Huntington’s will never suffer from that disease in their lifetime. However, the onset of multifactorial disorders results from a complex set of effects exerted by multiple genetic and environmental factors.

The vast majority of cancer is considered multifactorial rather than genetic; however, there are cases where some types of cancers are strongly influenced by genetics. For example, people with observed mutations in their tumor-suppressing BRCA1 and BRCA2 genes have an increased risk of developing breast or uterine cancer. Currently, the issues in underwriting practice are related to single-gene disorders, in which genetic factors have an one hundred percent impact, and some cancers, for example, in which genetic factors are considered extremely significant.

When considering autosomal recessive genetic diseases, onset occurs only if mutated genes are inherited from both the mother and father (25 percent probability). Thus, it is obvious that any individual is a carrier of some diseases (see Figure 2). Here, the term “carrier” refers to any person who carries one normal and one mutated gene in their homologous DNA pair (one originating from the father and one from the mother). If the person has not inherited mutated genes from both parents, then the disease will not manifest; therefore, that person would not be aware that they are carriers of the disease.

The expansion of genetic testing also brings about the opportunity for people to recognize these previously unknowable risks. Further, the increasing desire of people to control risks related to their bodies will lead to the expansion of processes like prenatal diagnoses or enhancements.[1] This move could get increasingly irreversible from now on.

For people who have no financial restrictions, the issues raised in this paper on insurance underwriting may not hold any deep meaning. However, it would likely become a significant economic issue for most people if approval for insurance subscriptions were to hinge on genetic testing results. In addition, there may also be a psychological burden incurred by being unable to obtain insurance. On the other hand, if genetic testing becomes routinely used for regular checkups, it is theoretically possible that failure to use genetic information for underwriting could lead to adverse selection,[2] and the negative influence may be unavoidable.[3]

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[1] "Enhancement is a word originally meaning to 'make greater, make stronger.' The practice of using medical technology to go beyond 'treating' an illness and strengthen human attributes is dubbed 'enhancement.'" (Tamai, Mariko and Matsuda, Jun, eds. 2013, p. 113)

[2] "Adverse selection" refers to an occurrence wherein one would subscribe to insurance more or increase insurance money when made aware of higher risk of loss. The existence of adverse selection leads to increased benefit claims, and is not desirable for management of an insurance company. However, there are notable perspectives present that higher risks pose insurance's *raison d'etre* and insurance companies' role in society.

[3] For more on the potential negative influences from not utilizing genetic testing results in underwriting, see this author's previous publication (Miyachi, Tomoka, 2005, pp. 109–30).

Trends in Genetic Testing and Insurance

North America

With the development of genetic medicine, represented in expressions like "order-made medicine," [4] a negative aspect has also been noted that exerts a damaging influence on hiring, promotion, marriage, subscription to insurance, and other areas. This influence, in general, is called "genetic discrimination."

In the United States, as the problem of "genetic discrimination" in hiring, promotion, marriage, and insurance subscription became apparent, since 1991, many states have enacted legislation prohibiting the use of genetic testing results in medical insurance underwriting. Following this trend, the use of information gained from genetic testing in hiring, promotion, or subscribing to health insurance is prohibited by U.S. federal law.

In a country such as the United States, where there is no comprehensive medical insurance system covering all citizens, the private share of the medical insurance system is significant. This may have an un-ignorable financial and psychological influence. For that reason, and given the several societal and ethical issues, the federal law passed in May 2008 in the United States prohibits discrimination by employers and health insurance companies based on an individual's genetic information (Genetic Information Nondiscrimination Act: GINA). This law prohibits employers from using genetic information in hiring and promoting employees. In addition, health insurance companies are now prohibited from denying coverage or charging premiums to currently healthy individuals solely because they carry a mutation that makes them susceptible to a particular

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[4] "Medicine up to now has involved giving a uniform treatment (ready-made medicine) when diagnosing the same illness between patients. However, it has been known for some time that the state of the illness (its condition, treatment efficacy, side effects) varies, and it is not always appropriate to apply the same treatment (medicine/dosage) to the same illness. By contrast, it is becoming more advocated that each individual's characteristics, that is, diversity, be taken into consideration when practicing medicine (diagnosis/treatment) optimally (order-made medicine)." (Tamai, Mariko and Matsuda, Jun, eds. 2013, p. 168).

disease. However, GINA does not apply to employers with fewer than 15 employees. In addition, GINA does not apply to life insurance, disability insurance, or long-term care insurance.

Established in 1965, public medical insurance in the US focuses on Medicare for the elderly and disabled and Medicaid for low-income persons. With the ethos of self-responsibility and free-market competition as core principles, the medical system is relegated to market forces; thus, more than half the population subscribes to private health insurance either through their employer or independently. Though some of the most affluent may benefit from the finest in medical technology and services, those working in small to medium-sized companies or otherwise in an unstable employment situation and the unemployed may find it impossible to acquire health insurance.

UK

In contrast to the U.S., the UK utilizes its national budget to provide the services of its National Health Service (NHS) to all residents. In countries such as the UK and Japan, where the government provides comprehensive healthcare services, the crucial areas concerning genetic testing are not in the health insurance areas, but revolve around life insurance and other insurance instruments.

Notable among the trends in life insurance and genetic testing is an October 2000 decision made by the Genetics and Insurance Committee (GAIC),[5] an advisory committee to the UK's Department of Health. This decision permits the use of information from existing genetic testing

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[5] The GAIC is a third-party organization that evaluates genetic testing and reviews its applicability to insurance; in addition, it oversees trends on insurance company use of genetic testing and issues reports.

that reveals the presence of mutations associated with Huntington's disease[6] in risk selection for life insurance. Still, this decision drew attention because of its significant variance from the worldwide trend to restrict the use of genetic testing results.

In response to this decision, the House of Commons of the UK's Science and Technology Committee recommended a re-evaluation in April 2001. It demanded a moratorium on government and industry's use of genetic testing results for at least two years. The Human Genetics Commission (HGC)[7] also issued a demand in May 2001 for a minimum three-year moratorium for genetic testing-based insurance contracts below £500,000, regardless of the insurance type, and a recommendation for legislating the said moratorium.

In response, the Association of British Insurers (ABI) altered the text in its Code of Practice from "[a] moratorium period shall be set for life insurance contracts connected to mortgages under £100,000" to "[g]enetic testing results shall not be used in insurance contracts below £300,000 regardless of the type of insurance." The ABI followed up in October 2001 by announcing a more rigorous moratorium plan (effective November 2001).

More specifically, the plan 1) enacts a five-year moratorium on the use of genetic testing results; 2) applies a moratorium for life insurance contracts under £500,000 in value and other

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[6] As per the Ministry of Health, Labor and Welfare's overview of "Huntington's disease" in the "Specified Intractable Diseases (New), Enforced Jan. 1, 2015," Huntington's disease is defined as "a chronic and progressive neurodegenerative disease with autosomal dominant inheritance and primary symptoms of dementia, involuntary movement, primarily chorea, and mental disorder," and further described as "primarily occurring in adults, with peak age of onset in the thirties, but there have been observations of onset in a wide variety of ages from infancy to old age" (http://www.mhlw.go.jp/file/06-Seisakujouhou-10900000-Kenkoukyoku/0000089959.pdf). Also, as per the Japan Intractable Disease Information Center homepage of the Japan Intractable Diseases Research Foundation (http://www.nanbyou.or.jp/entry/175): "four to eight per 100,000 persons will suffer from the disease in Caucasoids," and it notes that "studies in our nation show that only approximately 0.5 per 100,000 will suffer from it, one-tenth of that in Europe and North America." In Japan, Huntington's disease applies for public health expenditure.

[7] The HGC is an independent government advisory body for genetics.

insurance contracts under £300,000 in value; and 3) demands that the use of genetic testing results receives approval from the GAIC.

This voluntary moratorium (Concordat and Moratorium on Genetics and Insurance), enacted in November 2001, entered a new phase in October 2018. There will be periodic reviews with the Code on Genetic Testing and Insurance, published by agreement between the government and the Association of British Insurers. Still, unlike before, there is no pre-determined deadline. The expectation is to allow most people to undergo genetic testing without concern.

Currently, except for income security insurance policies above £30,000 per year, life insurance policies above £500,000 per person, and critical illness policies above £300,000 per person, applicants can apply for insurance without notifying the insurance company of the results of genetic testing they have already taken at the time of application. In addition, the only scenario in which genetic test results are currently used with GAIC approval is for Huntington's disease in life insurance policies above £500,000.

Japan

There are no insurance companies in the U.S., UK, or anywhere on the planet that require applicants to undergo genetic testing. However, there are cases where requested disclosure for existing genetic testing results, depending on the type and value of the insurance policy and the region in question.

In the Japanese insurance industry, due to industry self-regulation, genetic testing has not been used for underwriting in the past or present, nor is it regulated by law. Nor was the industry's official position[8] made public. Recently, however, a major change has been noticed.

On April 6, 2022, doctors from the Japanese Association of Medical Science, the Japanese Medical Science Federation, and the Japan Medical Association released a joint statement[9] titled "Joint Statement on 'Prevention of Unfair Discrimination and Social Disadvantage due to Genetic and Genomic Information.'" The three main requests are as follows.

1. The government should promptly establish a legal framework to prevent unfair discrimination and social disadvantages caused by genetic and genomic information.

Furthermore, after preventing inappropriate handling of such information, relevant ministries and agencies should establish a council to discuss how to utilize genetic and genomic information of individuals in social and economic policies, including insurance and employment. The regulatory authorities should establish a committee to discuss how to prevent the inappropriate handling of personal genetic and genomic information and how to utilize such information in social and economic policies, including insurance and employment.

2. The regulatory authorities should encourage insurance companies and other businesses that may handle genetic and genomic information, as well as related organizations, to promptly implement self-regulation protocols for the handling of genetic and genomic information, and establish a system to provide guidance and supervision to ensure that the content of such regulations is appropriate and easy for consumers to understand.

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[8] Though there was a report titled "Genetic Testing and Life Insurance" compiled by the Genetics Research Group (a private research group composed of medical reps from insurance firms and other members), there was no official published industry position.

[9] The Japanese Association of Medical Sciences Home Page (https://jams.med.or.jp/news/063.pdf)

3. Insurance companies and other businesses that may handle genetic and genomic information and related organizations should hold open discussions on the handling of genetic and genomic information and promptly consider and announce voluntary measures.

On May 27, 2022, in response to this statement, the Life Insurance Association of Japan announced on its website that Japanese life insurance companies do not collect or use genetic information in their life insurance underwriting and payment practices.[10]

Research concerning genetic testing and insurance in Japan primarily takes a theoretical approach. However, in light of advancements in medicine, the speed of technological development in diagnosis and treatment, and the recent trends in several foreign nations, the day when issues surrounding genetic testing and insurance being discussed as a practical matter in Japan may not be so far off.

Because genetic testing is not in use for insurance underwriting in Japan, discussions surrounding genetic testing and insurance have not progressed in Japan as in Europe and North America. As such, a panel of recent changes in the status of genetic testing and how the insurance business accommodates such changes in Europe and North America would yield beneficial suggestions on future practical issues and solutions in Japan; indeed, this would also be demanded by society.

Then, in light of the situation and policies in other countries, this paper will examine how the Japanese government can best recommend or request policies for the insurance industry about genetic testing. Assuming that a comprehensive health insurance system covering all citizens will be maintained in the future, the role of private insurers in medical coverage is to supplement

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[10] The Life Insurance Association of Japan Home Page (https://www.seiho.or.jp/info/news/2022/pdf/0527.pdf)

government and corporate coverage. Therefore, it is necessary to separate government coverage from private coverage.

For single gene diseases such as Huntington's disease, the influence of genetic factors is one hundred percent. In other words, if the genetic test result is negative, there is no chance of contracting the disease in the future. On the other hand, a positive result ensures that the disease will develop in the future ($r=1$), although the timing and speed of the disease's progression cannot be predicted. For such diseases, it is difficult to be covered by private insurance (when private insurance can cover diseases, it is when $0<r<1$), so it is preferable to handle such diseases within the framework of the social security system.

As a prerequisite for Japanese private insurers to use the information from genetic testing, it is first essential that the negative effects of adverse selection by genetic testing, such as a rapid increase in insurance claims, have a significant impact on the management of insurers.

In addition, since genetic information affects not only the individual but also relatives and descendants at large, it is necessary to require insurers to protect privacy to prevent genetic discrimination. It is highly desirable that strict penalties and legal action be taken in the unlikely event that an insurer divulges personal information. It is also necessary to establish a more robust genetic counseling system, especially for diseases such as Huntington's disease, for which genetic testing can accurately predict the onset of the disease, but for which there is no prevention or cure.

On the other hand, there are some lessons that other countries can learn from Japan about how to approach the issue concerning genetic testing and insurance. In Japan, insurers do not currently use genetic testing in underwriting. This is not by law, but by voluntary regulation by the industry. Once legislated, it becomes difficult for insurers to respond quickly and flexibly to any environmental changes. Therefore, as long as voluntary regulation by insurers is functioning properly, the situation is more desirable for both consumers and insurers than regulation by law.

However, both for insurance management reasons and in light of public opinion, there is little need for insurers to take proactive action on the use of genetic testing in the foreseeable future. In addition, unlike the U.S., Japan does not currently use family history for underwriting. This indicates that proper underwriting can be performed without the use of family history if other information is available instead. Similarly, it can be argued that even if genetic testing is not available in the future, proper underwriting will continue to be possible as long as alternative useful information is available.

It should be noted, however, that the limited information available to insurers means that the insurance principle of imposing a risk-based premium rate on policyholders can be relaxed. In recent years, insurance products such as those in which people disclose their exercise history and the results of medical examinations to insurance companies via Apple Watch and other devices, and seek premium discounts based on their own favorable health risk, have been attracting worldwide attention. This is an example of consumer preference for risk segmentation.

Will Japanese consumers demand risk segmented insurance in the future? Or will they seek "insurance" that is more mutual aid oriented, incorporating those with higher risk? If so, the insurance group as a whole will bear a greater burden due to higher claims payments, and the average premium per person will be higher. Whichever choice consumers make, insurers can develop insurance products accordingly and actuaries can set premium rates. The future of insurance needs to be discussed based on consumers' understanding of insurance principles and insurance mechanisms.

Issues about Insurance Underwriting Practices

The Changing State of Insurance Underwriting

A non-smoker discount is part of a worldwide system to classify risk. The explicit recognition of the relationship between smoking and disease has led to the introduction of non-smoker discounts on many insurance products. For example, in the United States, non-smoker discounts were already popular in the 1970s. In Japan, questions about smoking habits have been asked in reporting forms since 1994. Smoker tests utilizing urine and saliva have also been in place since 1998.

Conversely, race-based rates, formerly considered part of appropriate risk classification and adopted in some places, are now discriminatory worldwide and are not in use. In addition, many insurance products in Japan have introduced gender-based rates, which some U.S. states consider "discriminatory." Based on a decision by the European Court of Justice on March 1, 2011, new policies came into effect in the EU that banned all kinds of insurance, including automotive, life, and pensions, from setting rates based on gender, for the new contracts made on and after December 21, 2012.

Once legislation is enacted, the insurance industry must react to it; insurance itself has "limits"[11] by which it must handle changes in the societal landscape *ex post facto*. In actuality, the insurance industry and insurance researchers in the EU had already widely discussed the influence of a ban on gender-based rate-setting on insurance company management and policyholders before the legislation became effective. However, now that gender-based rate setting is prohibited by law, insurers are solemnly handling the issue as long as the impact on management and society is not

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[11] Maekawa, Yutaka (1982, pp. 1–19) focuses on the "limits" that insurance products and systems naturally have.

excessive. In addition, this issue is unlikely to come to the general public's attention again in the future as long as no significant harmful effects result.

The examples of non-smoker discounts and gender-specific premium rates genuinely show that insurance underwriting is not fixed but can change with the environment (legislation, etc.) and people's value judgments. Similarly, handling genetic testing in underwriting is also a dynamic situation.

Medical Advances and Their Influence on Insurance Underwriting

One of the most notable changes in the environment in recent years is probably the striking technological innovation in bioscience. For example, examining urine or blood alone to detect even small cancers is a technology already in clinical use. If surgery or other treatments could be applied while tumors are still small, it would enable low-stress therapies, like an endoscopy, which could be completed within a single day with a good prognosis. For those with a higher risk of cancer, conducting these sorts of tests at regular short intervals would benefit from being able to deal with cancer at its extremely early stages. Additionally, there is the perspective that the economic burden would be eased for both insurers and consumers if procedures were conducted in those early stages. However, for those at higher risk, a single claim could be stretched across several claims, even if the amount of each claim is smaller in the latter case. It is conceivable that there could be influence over actuarial operations with the increase in those patients undergoing examination.

Genetic testing has one vastly different point of distinction from other medical testing. That point is its ability to predict future risks. Even at present, some genetic tests can accurately predict the chance that some diseases may occur in the future. Huntington's disease, for example, is an intractable neurological disorder that affects people who have inherited a genetic mutation, primarily in middle-aged and elderly. Almost all will contract the disease (excluding those who die from accidents/suicide/other diseases/etc. before onset) and die within an average of ten to twenty years thereafter. Those who have inherited the Huntington's mutation will contract the disease at some point if they continue living, even if they enjoy a good physical state. However, the age at which the disease will manifest and the progression of its symptoms cannot be predicted. Though a diagnosis method does exist, there is a significant ethical dilemma presented by the current lack of essential prevention and treatment methods. The potential for depression and subsequent suicide calls for ample explanation and counseling before testing. Even if adequate counseling is provided, it may not prevent suicide in patients who are informed of the test results.

Underwriting practices in Japan apply existing symptoms and medical history in their examinations, estimating future risks based on this data and calculating premiums. Genetic testing is, at present, not applicable to Japan's underwriting practices. However, there are some limited cases in the UK, such as in certain types of insurance and high-value policies and testing for specific illnesses, where genetic testing is already being implemented in underwriting. It can be believed that the presupposition of insurance underwriting—that being, estimating future risk based on policy applicants' present and past circumstances—is gradually changing.

If the proliferation of genetic testing were to continue, attention would increasingly turn to preventive medicine over time. Consequently, we may forecast an increasing number of people who take more proactive and innovative methods to prevent illness. In addition, the drastic shift in concepts of "health" and "illness" would be indicated as a potential for insurance underwriting to deal with these changes.[12] Change may also be needed in the design of insurance products in

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[12] See Sasaki, Mitsunobu (2013, pp. 31–48) for more on the influence exerted by medical advances on the insurance business.

response to changes in people’s insurance needs and claims configuration (frequency/value). As such, because medical advances significantly influence insurance underwriting practices and these advances are accelerating in recent years, insurers and other entities will need to prepare more quickly for these environmental changes.

Conclusion

The functions and roles of insurance have transformed over time in response to various factors, including societal changes such as economic and social security systems and technological innovation, and shifts in values. Similarly, underwriting’s form has also altered in response to public opinions and environmental changes. Though there is already demand that the insurance business respond to the always-present environmental changes in medical technology, social and economic systems, legislation, etc., caution is probably necessary concerning the recent incomparably rapid changes in this environment.

In particular, the recent tightening of restrictions on the information available to insurance companies is a double-edged sword for both consumers and insurance companies. Careful selection of the data to which insurance companies have access is vital for privacy protection, information security, and individual rights. On the other hand, if the adverse selection effects of the limited information that insurers can use in underwriting become excessive, the insurance group will bear the brunt of higher premiums, ultimately leading to higher premiums for each policyholder. This needs to be fully understood by consumers.

Value judgments on fairness in insurance underwriting are not only based on analysis of objective data; there are several heavily weighted subjective elements, including citizen awareness and the degree of social acceptance.[13] For that reason, there is a demand for underwriting practices to take note of changes in the societal environment and popular opinion, taking into ample consideration the consumers' perspective. It should also be stressed that there is no one-size-fits-all solution for the entire world.

In Japan, the birthrate is declining, and the population is aging faster than in the rest of the world. And the importance of private coverage has been increasing in recent years. The implications of this Japan-U.S. comparative study will help examine the future division of roles between the public and private sectors and the raison d'etre of private insurers such as insurance companies and cooperative insurers. It will also help examine measures to address the various socio-economic disparities in Japan in recent years.

■This work was supported by the Kampo Foundation's 2021 Survey Research Grant.

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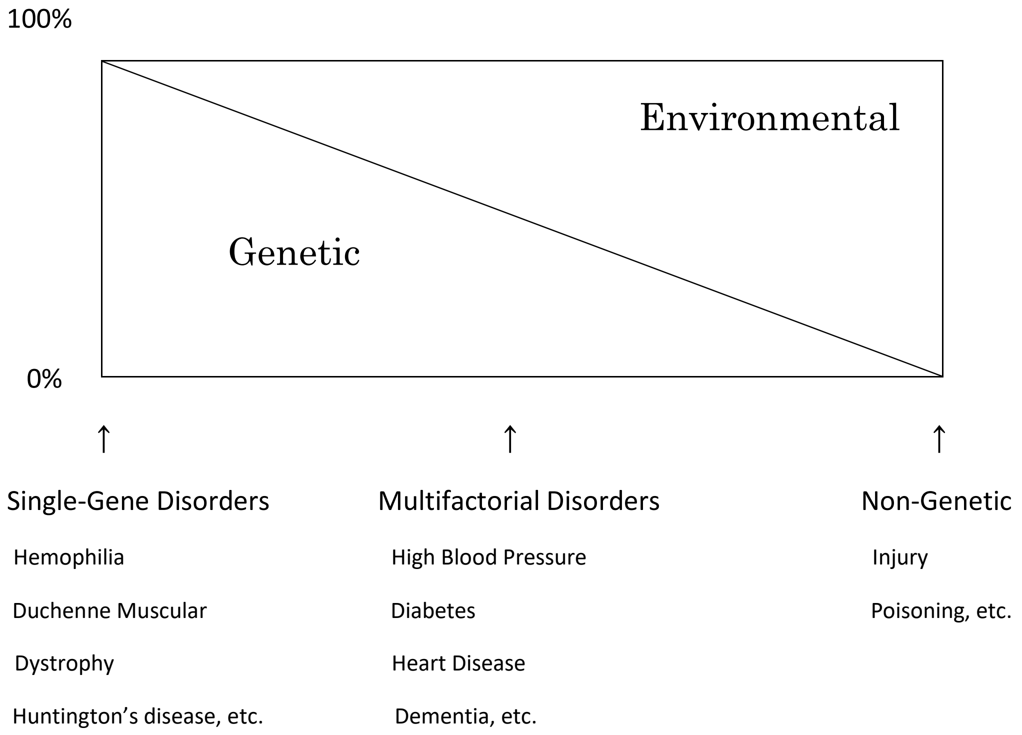
[13] See this author's previous publishing (Miyachi, Tomoka, 2011, pp. 41–57) for more on value judgments on fairness in underwriting.

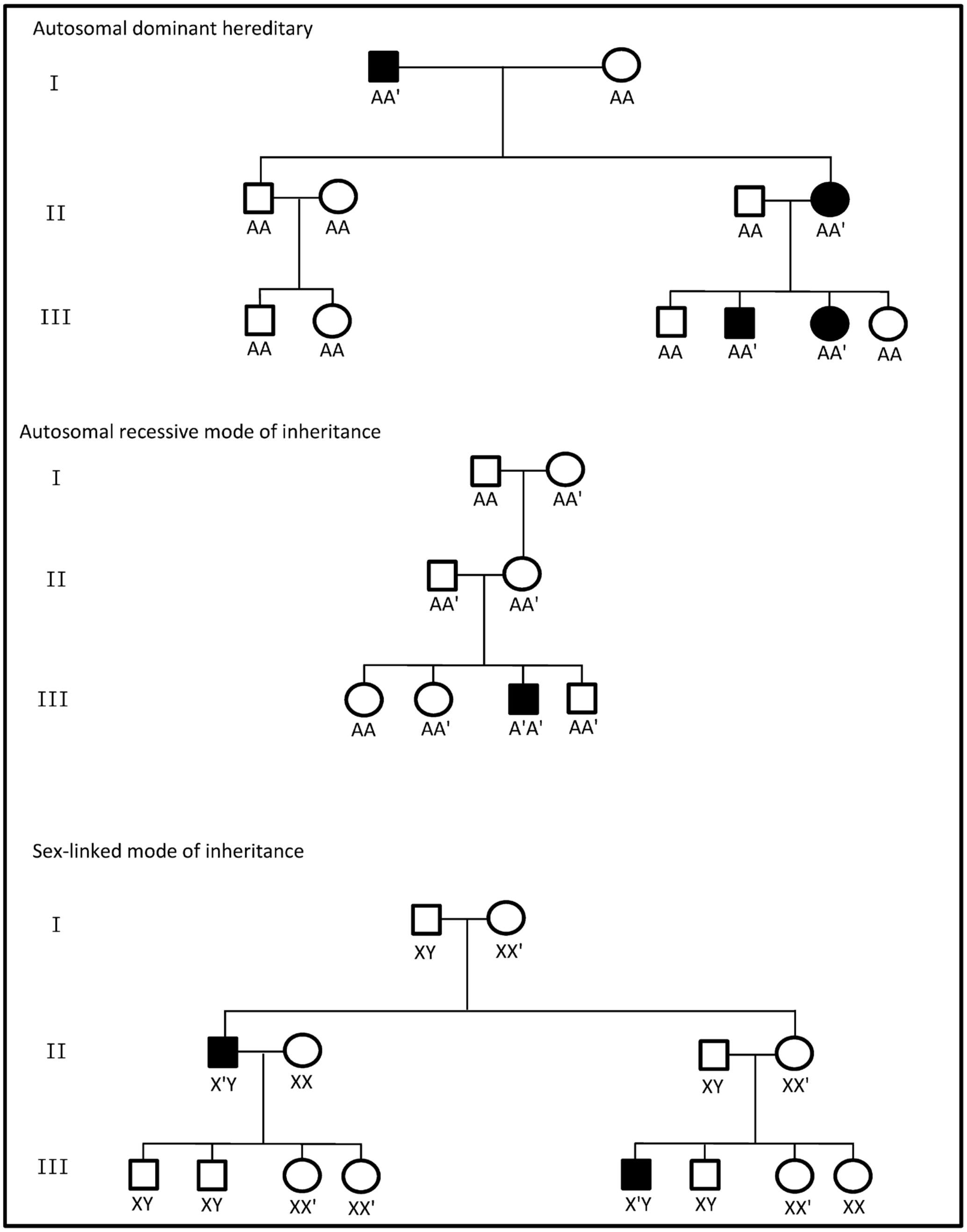
List of Figures

Figure 1 Relationship between genetic and environmental factors



Source: Kagawa, Yasuo and Sasazuki, Takehiko, eds. (2000), “Iwanami Lecture: Foundations of Modern Medicine 9–Genetics and Disease”, Iwanami Shoten, p. 123. (Modified by the author)

Figure 2 Modes of inheriting a genetic disorder



☐ are males, **O** are females, A are normal genes, A' are mutated genes, X are normal genes, X' are mutated genes, and black squares indicates a person with the disorder

Source: Matsuda, Ichiro, (1999) “Genetic medical treatment is on the move–imminent ethical problems–”, Shokabo, p.42.

BIBLIOGRAPHY

Arrow, K. J. (1963) “Uncertainty and the Welfare Economics of Medical Care,” *American Economic Review*, vol.53, no.5, pp.941–73.

Brackenridge, R.D.C., and Elder, W. John, eds. (2003) “*Hokenigaku–gensho dai-4han compact han*” (Medical Selection of Life Risks, 4th ed.), Trans. The Association of Insurance Medicine of Japan, Nankodo.

Browne, M.J. (1992) “Evidence of Adverse Selection in the Individual Health Insurance Market,” *The Journal of Risk and Insurance*, vol.59, No.1, pp.13–33.

Browne, M.J., Doerpinghaus H. I.（1993） “Information Asymmetries and Adverse Selection in the Market for Individual Medical Expense Insurance,” *The Journal of Risk and Insurance*, vol.60, No.2, pp.300–12.

Collins, Francis S., (2011) “*Idenshi iryo kakumei”* (The Language of Life: DNA and the Revolution in Personalized Medicine), Trans. Yano, Machiko, NHK Shuppan.

Ezawa, Masahiko, (2006) *“Iryohoken wo meguru underwriting no sho kadai*” (Issues on Underwriting Involving Medical Insurance), from Hotta, Kazuyoshi’s *Minkan Iryohoken no senryaku to kadai,* ch. 5, (Strategy and Issues of Medical Insurance), Keiso Shobo.

Fukushima, Yoshimitsu (Supervising Editor), Tamai, Mariko, ed. (2007) “*Iden iryo to rinri, ho, shakai”* (Genetic Treatment and Ethics, Law and Society), Medical Do.

Greely, H. T. (1998) “Legal, Ethical, and Social Issues in Human Genome Research,” *Annual Review of Anthropology,* vol.27, pp.473–502.

Hotta, Kazuyoshi, (2000) “*Minkan hoken ni okeru naibu hojo no gourisei to genkai*” (Logic and Limits for Cross-Subsidies in Private Insurance), *Bunken Journal*, vol. 130: 51–83.

Hotta, Kazuyoshi, (2003) “*Hoken riron to hoken seisaku*” (Insurance Theory and Policy), Toyo Keizai Shinposha.

Hotta, Kazuyoshi, (2004) “*Iryo risk no tokusei to iryohoken*” (Characteristics of Medical Risks and Medical Insurance), *Journal of Insurance*, vol. 56: 23–48.

Kagawa, Yasuo and Sasazuki, Takehiko, eds. (2000) “*Iwanami koza: gendai igaku no kiso 9: iden to shikkan*” (Iwanami Lecture: Foundations of Modern Medicine 9–Genetics and Disease): 123, Iwanami Shoten.

Le Grys, D.J. (1997) “Actuarial Considerations on Genetic Testing,” *Philosophical Transactions: Biological Sciences,* vol.352, No.1357, pp.1057–61.

Macdonald, A. S. (1997), "How Will Improved Forecasts of Individual Lifetime Affect Underwriting?" *Philosophical Transactions: Biological Sciences,* vol.352, No.1357, pp.1067–75.

Maekawa, Yutaka, (1982) "*Hoken no genkai*" (The Limits of Insurance), *Journal of Insurance Science*, vol. 496: 1–19.

Miyachi, Tomoka, (2005) "*Idenshi kensa to hoken*" (The Impact of Genetic Testing on Insurance), *FSA Research Review 2005 (Vol. 2):* 109–30.

Miyachi, Tomoka, (2011) "*Hoken ni okeru kiken sentaku to koheisei*" (Fairness and Reasonableness in Underwriting Process), *Journal of Insurance Science,* vol. 614: 41–57.

Okada, Toyoki, (2001) *"Idenshi shindan to hokengyo no hoteki kosaku"* (Legal Ambiguity in Genetic Diagnosis and Insurance), *Journal of Insurance Science*, vol. 574: 62–86.

Pauly, M.V. （1968） "The Economics of Moral Hazard," *American Economic Review*, vol.58, pp.531–37.

Sasaki, Mitsunobu, (2001) "*Seimei hoken no kiken sentaku*" (Risk Selection in Life Insurance), *Journal of Insurance Science,* vol. 574: 47–61.

Sasaki, Mitsunobu, (2013) "*Igaku no shinpo to hoken yakkan*" (Medical Evolution and Policy Provisions), *Journal of Insurance Science*, vol. 621: 31–48.

Subramanian, K. *et al.* (1999) "Estimating Adverse Selection Costs from Genetic Testing for Breast and Ovarian Cancer: The Case of Life Insurance," *The Journal of Risk and Insurance*, vol.66, No.4, pp.531–50.

Takii, Hiroomi, (2005) "*Jintai business: zoki seizo/shinyaku kaihatsu no kinmirai*" (The Body Business: the Near Future of Organ Production/New Drug Development), Iwanami Shoten.

Tanaka, Junzo, (1998) "*Hokenkyoritsu no kubun ni tsuite*" (On Classification of Insurance Premiums), *Bunken Journal*, vol. 122: 169–86.

Tamai, Mariko and Matsuda, Jun, eds. (2013) "*Series seimei rinrigaku dai-11kan: idenshi to iryo*" (The Japanese Bioethics Series Vol. 11: Genetics and Medical Care), Maruzen Shuppan.

Yamamoto, Tatsuhiko, (2008) "*Idenjoho no horiron*" (Legal Theory on Genetic Data), Shogakusha.

Yamano, Yoshiro, (1998) "*France/Belgium ni okeru kokuchi/tsuchi gimu seido kaikaku to ronri*" (Reform and Logic in Notification Requirement Systems in France/Belgium), *Bunken Journal*, vol. 122: 47–86.