

Behavioral Economics of Taxation and Benefits**

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Abstract

This paper presents a survey of research utilizing insights from behavioral economics in the economic analysis of taxation and benefits and discusses Japan's taxation and benefits policies from the viewpoint of behavioral economics. Behavioral economics is a collective term that is applied to research based on models in which the agent behaves under assumptions that differ from the "standard assumptions." In recent years, there has been a sudden upsurge in research, even in theoretical analysis and empirical research on taxation and benefits. Specifically, studies are being conducted on topics such as tax-related inattention, the impact of taxation and benefits complexity, institutional design of retirement savings and pensions, promotion of tax payment, and the effects of benefits on labor, education and medical care. From the theoretical aspect, researchers are studying its relationship with optimal taxation. Knowledge of behavioral economics offers a new perspective to evaluate systems and policies related to taxation and benefits in Japan and has the potential to propose institutional design that is based on a more realistic image of humankind.

Keywords: Taxation and benefits, behavioral economics, optimal taxation

JEL Classification: D91, G41, H20

I. Introduction

Taxation and benefits are crucial means for appropriately operating the government, transforming people's behaviors to enhance social welfare, and reducing inequality, and they represent central issues analyzed in public economics. In the economic analysis of taxation and benefits, individuals have been assumed to make decisions to maximize their utility under various constraints, which is a standard assumption in economics.

The standard assumptions of economics have been tested from various perspectives, and it has been shown that humans do not necessarily behave according to these assumptions

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(e.g., DellaVigna 2009). The insights obtained from these tests are now collectively termed “behavioral economics.” For instance, the following findings are widely recognized: 1) In intertemporal choices, there is a widespread presence of present bias, where the present is preferred inconsistently over the future. 2) Utility is not always judged by absolute values; it is often assessed relative to a reference point (reference dependence), and losses below the reference point are strongly avoided (loss aversion). 3) Choices are made not only based on one’s own distribution, but also considers the distribution to others and the intentions of others (social preferences). 4) Decisions are not made by utilizing all available information; there is often inattention to some information. 5) In complex situations, it’s not possible to process all information, and decisions are occasionally made based on simple rules.

In the analysis of taxation and benefits within public economics, insights from behavioral economics are increasingly being utilized. A significant turning point was around 2010 when leading economists in public economics, such as Raj Chetty and Emmanuel Saez, published analyses incorporating insights from behavioral economics. Since then, over approximately the past decade, various studies have been conducted. Empirically, experimental methods and the use of administrative data, which progressed during the same period, have demonstrated the existence of behaviors related to taxation and benefits that cannot be explained by standard assumptions. Moreover, analyses of non-standard intervention methods, collectively referred to as “nudges,” such as default settings and information provision, have also been conducted. Theoretically, analyses assuming non-standard behavior by consumers have become more common. Additionally, various examinations of welfare judgments in situations where such consumers exist have also been initiated.

This paper aims to broadly introduce research that includes insights from behavioral economics on taxation and benefits^{1,2}. In Section II, we provide an overview of the entire landscape of behavioral economics. In Section III, we introduce empirical studies on taxation and benefits that incorporate insights from behavioral economics. In Section IV, we present theoretical studies on taxation that assume non-standard behavior by individuals. In Section V, based on the findings so far, we discuss Japan’s tax and benefit policies from a behavioral economics perspective.

¹ In the process of writing this paper, a comprehensive collection of public economics papers that included elements of behavioral economics revealed an exceedingly vast number of literatures. Consequently, I have narrowed down the articles to be introduced mainly to those published in specific journals, namely, the so-called top five journals (AER, ECTA, JPE, QJE, REStud), the Journal of Economic Perspectives, four journals of American Economic Journal, and the Journal of Public Economics. There are also many publications in general journals such as the Journal of European Economic Association and Journal of Economic Behavior & Organization, and public economics journals like International Tax and Public Finance, and National Tax Journal. In 2017, Public Finance Review featured a special issue on Behavioral Public Economics, and in 2022, FinanzArchiv/Public Finance Analysis did the same on Behavioral Taxation.

² There are various surveys and materials available on the use of behavioral economics in public economics, which were used as references for this paper. In 2018 and 2019, the Handbook of Behavioral Economics was published, and Bernheim and Taubinsky (2018), which is included in the collection, conducted a survey on “Behavioral Public Economics”. Also, Behavioral Household Finance (Beshears et al. 2018) and Behavioral Inattention (Gabaix 2019) were referenced. The materials from the NBER Behavioral Public Economics PhD Student Boot Camp conducted in May 2022 by leading researchers in this field, which include slides, videos, and reference lists, are publicly available (<https://sites.google.com/view/behavioralpublic/home>, accessed on June 26, 2023), and were used as references for this paper.

II. Summary of Behavioral Economics

II-1. What is “Behavioral Economics?”

In this section, I would like to explain what kind of academic field “behavioral economics” is. The definition of the term “behavioral economics” is not clear, and understanding differs among people, both inside and outside the field of economics. One reason for this difficulty in understanding lies in the term “behavior” as referred to in behavioral economics, which diverges from its general meaning. For instance, while “behavior” is defined as “body movement” in some general dictionaries, the behavior addressed in behavioral economics does not necessarily involve body movement. Moreover, it doesn’t compare “psychoanalysis” with “behavior analysis” as seen in psychology, nor does it contrast “act” with “behavior” as in sociology.

So, what does “behavior” in behavioral economics refer to? It’s a technical term that means “the agent in the model is operating under assumptions that differ from the standard ones.” When the term “behavior” is followed by a field of economics, it also has a similar meaning. For instance, “behavioral labor economics” should be understood as “a collective term for labor economics research in which the agent in the model operates under assumptions different from the standard ones.” The behavioral economics of taxation and benefits, which is the theme of this paper, is part of the research collectively referred to as “behavioral public economics.” To understand the word “behavior” in this context, one needs to comprehend what a model is in economics, what the standard assumptions are, and so on, which makes the term somewhat difficult to grasp. However, given that terms like behavioral economics and behavioral “field X” economics have already become widespread, we will proceed with the discussion based on this definition.

In defining behavioral economics, it is sometimes explained as “dealing with irrational behavior.” However, this explanation is often used for convenience to succinctly describe what behavioral economics is, and it is not frequently used as a definition. The reason is that it is difficult to clearly show whether behavior is rational or irrational. For instance, regarding inattention that ignores important information, it could be interpreted as “rational inattention” when considering the costs of information acquisition and processing. Also, social preferences that consider others are often classified as part of behavioral economics, but these can be expressed as rational models that incorporate the consumption or behavior of others into preferences. In this paper, we will refrain from using the word “rational” and consider the difference between economics and behavioral economics based on “whether they differ from standard assumptions.”

The difference between behavioral economics and psychology becomes quite vague in the boundary areas. Basically, if you are analyzing phenomena dealt with in economics from “non-standard assumptions,” it could be said to belong to behavioral economics. However, what constitutes “phenomena dealt with in economics” is also fluid. There are many examples of phenomena that were not considered the subject of economics in the past that could

be now. For instance, just as Gary Becker brought discrimination and crime to the table of economics, many psychological phenomena are now on the table of economics.

Recently, the term “behavioral science” has become more common. This is a collective term for various academic disciplines that deal with human behavior, including psychology, anthropology, sociology, and even economics, law, and psychiatry. However, the definition varies from person to person, and it is probably best to consider it a convenient name for collectively referring to various academic fields.

By the way, when one hears “behavioral economics,” it may sound like a major field of economics like public economics or labor economics, but it is not treated as such. For instance, in the JEL (Journal of Economic Literature) classification codes used to categorize economic papers, there is no term “behavioral economics” in the top-level categories signified by an alphabet. Instead, the category D9 under D “Microeconomics” is labeled “Micro-Based Behavioral Economics.” Additionally, E7 is “Macro-Based Behavioral Economics,” and G4 is “Behavioral Finance.”

II-2. Model of Behavioral Economics

The foundation of economic models lies in the decision-making of the players involved. Various entities can be considered as players, such as companies and governments, but here let’s focus on individuals (consumers and workers), who are primarily the subject of study in behavioral economics. Individual decision-making is formulated as a problem of maximizing a utility function, subject to certain constraints. At this point, it is assumed that an individual either knows their own utility function and can choose the optimal consumption, or the individual can choose their consumption as if they ‘seemingly’ know their own utility function. Typical variables in the utility function include consumption and leisure. Constraints in the maximization problem could be budget constraints or time constraints. Additionally, in decision-making, when individuals need to subjectively understand necessary information, this understanding is referred to as a belief or expectation. For example, one’s understanding of their future employment prospects would be considered a belief.

In the problem of maximizing the utility function, various assumptions are made. Ideally, the model should capture as wide a range of decision-making methods as possible, but if the degree of freedom is too high, interpretation becomes difficult, or the model may not be solvable at all. In economic models, not only is it necessary to solve the maximization problems of utility functions, but also complex processes such as equilibrium calculations and derivation of policy implications await thereafter. Therefore, a certain level of simplification is essential.

In economics, “standard” assumptions have been shared in the problem of maximizing the utility function. These assumptions and the models that adopt them are called by various names such as “traditional,” “neoclassical,” and “mainstream,” but in this paper, we will call them “standard” as a more neutral name. Behavioral economics formulates the problem of maximizing the utility function using assumptions different from the standard model. How-

ever, the assumptions in behavioral economics often take a form that includes the assumptions in the standard model as a special form. For this reason, it is more natural to say that the model of behavioral economics is an extension rather than different from the standard model.

From here, I will briefly explain the differences between the standard model and the behavioral economics model for each element of the problem of maximizing the utility function. For each element, I will explain it in three parts: utility function, belief, and decision-making, referring to DellaVigna (2009).

II-2-1. Utility Function

In standard economic models, simple utility functions are often used for simplification. However, in some cases, simple assumptions cannot adequately explain individual behavior.

(1) Time preference and present bias

When dealing with intertemporal choices in economic models, it is necessary to consider time preference, which expresses a preference for future utility. Time preference is represented by a discount factor, a parameter that discounts future utility into present utility. In standard economic models, it is assumed that the discount factor is constant over time, a concept referred to as exponential discounting. Under the assumption of exponential discounting, decisions are consistent if the circumstances do not change, regardless of when they are made.

On the other hand, in behavioral economics, hyperbolic discounting, where the degree of discounting increases as it approaches the present, and quasi-hyperbolic discounting, which uniformly discounts the utility of the future beyond the present, have been devised (Laibson 1997). Quasi-hyperbolic discounting is also known as the β - δ model, using the parameter δ for the discount factor and the parameter β to represent the present bias, which uniformly discounts future utility.

In models with (quasi-) hyperbolic discounting, decisions can change depending on the time point, so they are not consistent. For example, it's common to declare at the beginning of the year, "I'm going to diet this year," but when mealtime comes, you might overeat because you value your current utility. This issue of present bias is sometimes referred to as a problem of self-control.

The issue of present bias has a significant impact on intertemporal decisions that are also relevant to public economics, such as decisions about savings/borrowing, labor, and education. The existence of present bias is widely acknowledged (DellaVigna 2009), and it has become an indispensable element when modeling intertemporal decisions.

(2) Reference-dependent preferences and risk aversion

In standard economic models, the utility function depends solely on one's consumption. This implies that the utility function is not affected by factors other than one's consumption, such as the consumption of others or one's past consumption.

In contrast, behavioral economics has devised models in which the utility function is determined by reference to a benchmark, a concept known as reference dependence (Tversky and Kahneman 1991). In models with reference dependence, a loss aversion assumption is imposed, stating that utility decreases significantly when consumption is below the reference point, referred to as a “loss domain.” Furthermore, there are phenomena known as myopic loss aversion or narrow framing, which judge whether there is a loss in a narrow range (Benartzi and Thaler 1995, Thaler et al. 1997, Barberis, Huang, and Thaler 2006).

Potential reference points include zero, the current state, and past states. When the reference point is the current state, a bias towards maintaining the status quo, known as status quo bias, is preferred because it does not result in a loss. Köszegi and Rabin (2006) devised a model that uses “expectations” as the reference point. Inequality aversion (Fehr and Schmidt 1999), which will be mentioned later in the social preferences section, can also be interpreted as a kind of reference dependence that uses other people’s consumption as a reference point.

In standard economic models, individuals’ utility functions are assumed to be risk averse. In contrast, in the prospect theory proposed by Kahneman and Tversky (1979), it is assumed that due to diminishing sensitivity, individuals become risk-averse in the “gain domain” where consumption is above the reference point and risk-seeking in the “loss domain” where consumption is below the reference point.

If reference dependence exists, loss aversion can significantly change individual behavior, which can have a significant impact on policy design. For example, compensation systems that vary, such as commission-based systems, are less preferable when there is loss aversion (Herweg, Müller, and Weinschenk 2010), which can greatly affect labor supply behavior (e.g., Camerer et al. 1997). Moreover, risk preference can significantly influence the decision to take out insurance (Barsky et al. 1997).

(3) Social preferences

As mentioned in the previous section, in standard economic models, the utility function depends only on one’s own consumption and is not affected by the consumption of others (self-regarding preferences). (However, models dealing with altruism have been analyzed for a long time, mainly in macroeconomic models.) In contrast, situations where the consumption or behavior of others somehow becomes a variable in the utility function are collectively referred to as social or other-regarding preferences in behavioral economics.

There are various models of social preferences. When the consumption of others directly contributes to one’s own utility, this is called pure altruism. When not the consumption of others, but one’s own behavior that increases the consumption of others becomes a utility, this is referred to as impure altruism (Andreoni 1990). Models that experience disutility when there is inequality by comparing one’s own consumption with that of others are called inequality aversion (Fehr and Schmidt 1999). Inequality aversion assumes disutility when one’s own consumption is high and when it is low, but the disutility is greater when one’s own consumption is low. This can be considered a type of loss aversion mentioned earlier.

Models of reciprocity, where utility changes according to the intention of the other person's behavior and one tries to respond with good behavior to good intentions and with bad behavior to bad intentions, have also been devised (Rabin 1993, Falk and Fischbacher 2006).

Models of social preferences are particularly useful for phenomena that are difficult to explain with standard models, such as donations and voluntary provision of public goods. In activities in groups such as schools, workplaces, and sports, interactions including social preferences have a significant impact and are also referred to as peer effects (e.g., Mas and Moretti 2009, Yamane and Hayashi 2015). Moreover, as will be discussed later, approaches to change individual behavior by intervening to emphasize social preferences have also been adopted (e.g., Allcott 2011).

(4) Belief-based utility

In standard economic models, utility is derived from one's own "consumption." That is, utility is not obtained from things that are not consumption, even if they are related to one-self. For instance, consider individual abilities such as academic ability. In standard economic models, individual ability increases utility by leading to higher wages through improved labor productivity and increased consumption. In other words, utility is not obtained directly from individual ability itself.

In contrast, models have been devised in which utility is derived from some belief, not only from one's own consumption. For example, there are models involving intrinsic motivation (Bénabou and Tirole 2003), pride (Ellingsen and Johannesson 2008), and identity (Akerlof and Kranton 2000).

II-2-2. Beliefs

In standard economic models, it is assumed that people correctly understand the states of the world based on the information they have at hand, that is, they have accurate beliefs. However, it is known that there are various biases in beliefs.

(1) Subjective Probability

Human cognition about probabilities is biased, and it is known that there is a discrepancy between the actual probability (objective probability) and the probability that humans perceive (subjective probability) (Kahneman and Tversky 1979). A "probability weighting function" is a representation of the subjective probability as a function of the objective probability, and it is known to exhibit an inverse S-shape. Under this probability weighting function, small probabilities are overestimated (subjective probability > objective probability). The degree of this overestimation increases the smaller the probability. Conversely, large probabilities (which are not 100%) are underestimated (objective probability > subjective probability). The subjective probability rises significantly as the objective probability approaches 100%. The fact that the evaluation of certain things becomes significantly higher is also called the certainty effect.

(2) Overconfidence

The bias of overestimating one's own ability is called overconfidence, and it has been widely confirmed in psychology and behavioral economics literature. For example, in psychology, research on driving skills (Svenson 1981) and cognitive abilities (Kruger and Dunning 1999) is famous. In behavioral economics, managerial ability (e.g., Malmendier and Tate 2015) and overconfidence in competition (e.g., Niederle and Vesterlund 2007) have been analyzed.

II-2-3. Decision Making

In the standard model of economics, individuals are assumed to be able to make decisions that maximize utility based on their utility function and beliefs. However, maximizing the utility function often requires processing a variety of information, and this processing can often be difficult. When a problem is difficult, one may be distracted by what stands out, or decision-making may change depending on how it is presented.

(1) Inattention

In the standard model of economics, it is implicitly assumed that all information that should be considered in decision-making is used and that we are not swayed by unnecessary information. However, there are cases where we overlook information that should be considered or are influenced by unnecessary information. Overlooking information that should be considered is generally referred to as "inattention." "Salience" refers to responding to prominent information.

Chetty, Looney, and Kroft (2009), which will be discussed in more detail in Section III, showed that there is inattention to taxes (sales tax and liquor tax). Finkelstein (2009) showed that the elasticity of tolls on highways, when compared between cash payments and ETC (Electronic Toll Collection) systems, is lower in the latter case due to inattention. Other research dealing with inattention to prices includes those dealing with prices other than the main body, such as shipping charges (e.g., Brown, Hossain, and Morgan 2010). Also, a phenomenon of not looking at the right digits and only looking at the left digits is a type of inattention called "left-digit bias." Due to left-digit bias, when prices are displayed as "\$2,980," there is an effect of inattention to the latter "980" part and underestimating the price. Lacetera, Pope, and Sydnor (2012) demonstrated left-digit bias regarding the mileage of used cars using internet transaction data.

(2) Framing Effect

In the standard model of economics, if it's the same information, the interpretation should be the same no matter how it is expressed, and the decisions based on that information should be the same. However, there are cases where the way information is presented (framing) changes the decision-making process (e.g., Tversky and Kahneman 1981). For instance, financial incentives can be presented as "rewarding if a certain standard is reached" or "punishing if a certain standard is not met." This type of framing utilizes reference de-

pendence, and framing that emphasizes losses gives a stronger impression due to loss aversion. Hossain and List (2012) showed in a field experiment verifying whether framing affects productivity in a factory that expressing loss slightly increased productivity.

(3) Complexity

Non-linear incentives, which have been proposed in optimal tax theory and are used in actual tax systems, are one of the complex systems. In the standard model of economics, people are assumed to respond to marginal incentives. However, even when a system is presented, people may not necessarily be able to make decisions according to marginal incentives. Ito (2014) showed, in a study using household-level panel data, that in the case of power consumption with non-linear pricing, people are basing their decisions on average prices, not marginal prices.

II-3. Behavioral Welfare Economics

In the standard model of economics, the assumption that an individual makes decisions to maximize their own utility is important for considering social welfare. If this assumption holds, it means that an individual's decisions reflect their preferences (revealed preferences).

However, in the models of behavioral economics, it is assumed that individuals do not necessarily make decisions that maximize their own utility. Under such models, the revealed preferences may not always hold, and it is suggested that options other than the individual's decisions might enhance utility. The field that considers individual or social welfare in such situations is also called behavioral welfare economics (Bernheim 2009).

In the formal models of behavioral welfare economics, the individual utility considered by the social planner and the individual utility used by individuals for decision-making are discussed separately. The former utility is referred to as true utility, experienced utility, normative utility, ex post utility, etc., while the latter utility is called decision utility or ex ante utility. In this context, it is assumed that there is some bias in decision utility, preventing the maximization of true utility. For example, if there is a present bias, individuals make short-term decisions (decision utility), but what should be considered as welfare is long-term utility (true utility).

The negative impact of an individual's decisions on themselves is recently referred to as "internality" (e.g., Allcott, Mullainathan, and Taubinsky 2014). This is a relatively new term, contrasting with the impact that an individual's decisions have on others, called externality. However, it has started to be used in recent literature.

II-4. Intervention and "Nudge"

If individuals are not maximizing their own utility, intervention could potentially enhance utility. Such an intervention could also be referred to as "eliminating internalities." This is different from interventions in the standard model of microeconomics, which are

based on effects on others, such as externalities or public goods. The purpose of such government intervention on individuals could be described as a form of paternalism.

There are two main methods to enhance an individual's utility through intervention. One method is to change individual behavior through legal regulations or monetary incentives. This is a method that has traditionally been used in economics. For example, in Japan, there is an obligation to join the national pension system, which can be interpreted as assuming that individuals may not be able to save enough for retirement due to effects like present bias. Also, theoretically, distortions in decision-making due to internalities can be corrected with monetary incentives through taxation. Taxes on alcohol and tobacco can be interpreted as examples of this, and in the United States, recent introduction of the so-called "soda tax" on carbonated drinks has sparked various debates (e.g., Allcott, Lockwood, and Taubinsky 2019).

The other method is to change individual behavior without relying on regulations or monetary incentives, but rather by preserving the freedom of choice without coercion. This was named "nudge" by Richard Thaler and Cass Sunstein and has been widely disseminated among policymakers and others (Thaler and Sunstein 2008). A nudge is paternalistic in the sense that it is done for the benefit of the person being intervened on, but it is also libertarian in the sense that it preserves the freedom of choice. Thaler and Sunstein call it libertarian paternalism. It is also referred to as soft paternalism because it is not a strong regulation. (The regulations and monetary incentives are referred to as hard paternalism.)

Nudges come in various forms, ranging from significant interventions in decision-making to merely providing information. Although there is no established classification for nudges, I will explain them here by dividing them into three categories: default nudges, information-providing nudges, and social comparison nudges.

Default nudges are a technique to change people's choices by setting the option (called defaults) that is selected when no active choice is made. For example, it has been shown that the intention to donate organs changes significantly depending on the default setting for expression of intent (Johnson and Goldstein 2003). The intervention effect of default settings is known to be significant. On the other hand, it should be noted that the default setting can strongly reflect the views of the person setting the default, as it changes individual behavior without involving personal choices. A similar method to the default is mandatory active decision. This method does not set a default but forces individuals to make some kind of decision. This has the advantage of reflecting individual preferences more than the default, but it increases the burden on both the decision maker and the decision enforcer.

Information-providing nudges are techniques that promote better choices by effectively conveying information needed for decision-making. For example, health warnings written on cigarette packages are a type of information-providing nudge. Also, making administrative documents visually easy to understand to promote a specific decision is another type of information-providing nudge. One of the strengths of information provision nudges is their capacity to be executed at a local level, since they hinge on the creativity of how information is expressed. However, since they only provide information, their effects on behavior

change are often small.

Social comparison nudges are techniques that promote behavior change by comparing individual behavior with that of others. For example, Allcott (2011) conducted a study in which he was able to promote energy conservation by including a comparison with others in a report on electricity consumption. Like information-providing nudges, social comparison nudges can be relatively easily implemented as they involve a form of expression adjustment. However, it should be noted that social comparison does not necessarily lead to the direction desired by the designer, and that social comparison itself can produce negative utility.

Whether to use hard measures like regulations and incentives or soft measures like “nudges,” and which type of measure to use, requires consideration from multiple perspectives, such as the necessity of behavior change, the balance with freedom rights, political acceptability, and the cost of implementation. In behavioral public economics, various studies have been reported in recent years, and it is necessary to adopt an appropriate method while referring to these studies.

II-5. Relationship with Cognitive Ability and Income

It is a natural thought that if a person’s cognitive ability is high, cognitive biases will be smaller. Frederick (2005) has shown using the Cognitive Reflection Test, which he developed and has been widely applied since then, that individuals with higher cognitive abilities tend to aim for long-term benefits in intertemporal choices and make decisions based on expected value in risky choices. Dohmen et al. (2018) showed that there is a negative relationship between risk-taking and cognitive ability when it is undesirable to take risks (such as drug use, risky sexual behavior, and crime), while there is a positive relationship between risk-taking and cognitive ability when it is desirable to take risks (like asset formation).

Mullainathan and Shafir (2013) conducted a study analyzing human decision-making in a state of “scarcity,” when people lack time or money. When people are in a state of scarcity, their minds are occupied with what they lack, and their attention is drawn to it. For example, when money is scarce, attention is drawn to managing money at that moment, and attention to future money is lost. As a result, it becomes a negative cycle where scarcity generates scarcity. Lockwood (2020) surveyed the relationship between time preference and income, showing that lower income leads to a greater present bias (the present bias parameter β becomes smaller).

In public economics, many considerations are given to lower-income individuals when thinking about disparities and redistribution. Also, it is generally believed that people with lower incomes also have lower educational backgrounds and cognitive abilities (Hanushek et al. 2015). Such people are likely to have larger cognitive biases than the average, and it can be said that policies that take advantage of insights from behavioral economics are more demanded for these individuals.

III. Survey of Empirical Research

III-1. *Inattention to Tax*

Taxes on consumer goods, such as sales taxes and alcohol and tobacco taxes, are levied as a percentage of the base price. Based on standard economic models, if the tax rate is well-known information, decisions incorporating taxes would be made regardless of how the price is displayed. However, recent research has revealed that the way taxes are displayed can change consumer behavior.

Chetty, Looney, and Kroft (2009) uncovered the presence of tax inattention through two research papers in the United States. The first was a field experiment in a retail store. In this experiment, for some items in the store, tags displaying the total price including sales tax were added in addition to the usual display of the pre-tax price. The experiment showed that sales volume and revenue for the items with the new tags fell by 8%. The second survey focused on the fact that in the US, some portion of alcohol taxes are included in the total price displayed at the store, while another portion is added at the time of payment and not included in the displayed total price. Using variation across states and years, they examined the impact of the price display method on price elasticity. Statistical analysis revealed that while elasticity was high for prices inclusive of tax, elasticity was low for taxes not included in the displayed price.

In studies on inattention, decision-making models including inattention are constructed, and parameters related to attention are estimated. In this paper, we follow Gabaix (2019) in describing the attention parameter as m . An m of 1 indicates full attention, meaning decisions that fully incorporate information. An m of 0 indicates no attention at all. In the research by Chetty et al., m was estimated to be 0.35 for sales tax, and 0.06 for the portion of the alcohol tax not included in the displayed total price. This implies that when sales tax is not included in the total display, 65% of the sales tax, and when alcohol tax is not included in the total display, 94% of the alcohol tax is ignored.

Taubinsky and Rees-Jones (2018) used an online purchasing experiment to examine how the attention parameter m changes with tax rates and individual attributes. In the experiment, participants indicated their “willingness to pay” for various items. Depending on the experimental conditions, they responded with their willingness to pay under the assumption of either no tax, a standard sales tax, or a sales tax three times the usual rate. The results of the experiment estimated the attention parameter to be $m = 0.25$ when a standard sales tax was applied, whereas it was $m = 0.48$ when a sales tax three times the usual rate was applied. This indicates that the attention parameter changes based on the amount of tax to be paid. This result is consistent with Gabaix (2019), who synthesized various studies to show that the attention parameter is positively correlated with the value of the subject that could be overlooked. Furthermore, Taubinsky and Rees-Jones also indicated a relationship between inattention and cognitive ability, showing that m has a positive correlation with understanding of the experiment and financial literacy.

III-2. The Complexity of Taxation and Benefits

In public economics, the government aims to change individuals' behavior by establishing tax and benefit systems. However, even theoretically effective tax and benefit systems may not be effective if individuals do not understand them. In standard economic models, individuals are assumed to fully understand the system and make optimal decisions based on that understanding. However, understanding the system can be difficult, and individuals may make decisions based on incorrect perceptions.

Abeler and Jäger (2015) used a laboratory experiment to examine the impact of complex systems on individual behavior. In the experiment, individuals' behavior under two systems combining taxes and subsidies was compared. In the simple system, the tax and subsidy rules were limited to 2-4, and the marginal tax rate increased linearly with the amount of task. In contrast, in the complex system, there were 22-24 tax and subsidy rules, and the change in the marginal tax rate according to the amount of task was not monotonous. The experimental results highlighted behaviors that suggest a clear lack of understanding of the complex system. For instance, individuals were observed choosing a task amount where the marginal tax rate exceeded 100%. In such cases, performing the task would result in reduced rewards. Also, under the complex system, changes in behavior were small even when the system and the incentive structure changed. Furthermore, it was found that individuals with lower cognitive abilities were less able to respond to changes in the system.

Rees-Jones and Taubinsky (2020) demonstrated that people do not understand non-linear tax systems well, by asking them to predict tax amounts in hypothetical situations. Specifically, they showed the existence of a heuristic where people consider their average tax rate to apply in other situations.

One of the most complex systems in the United States, which has been the subject of many studies, is the Earned Income Tax Credit (EITC). The EITC is a tax credit that increases, remains constant, and then decreases as income rises, forming a mountain shape. The amount of tax credit and the thresholds at which it starts to increase, remain constant, and decrease, change depending on the number of children. There are also various eligibility requirements. The EITC changes the marginal tax rate at the income where the tax credit stops increasing and starts decreasing, and theoretically it is expected that the density of income distribution will increase at that point (bunching). However, Saez (2010) showed that such an increase in density is not observed except for single individuals, suggesting that the system is not well understood. Chetty and Saez (2013) examined the impact of advice about the EITC from tax experts on income through a large-scale field experiment. Although the results of the experiment were not clear on average, they indicated that there could be an effect depending on the amount of knowledge of the expert. Chetty, Friedman, and Saez (2013) showed that in regions where there is a lot of knowledge about the EITC, responses to changes in the EITC system are significant. In summary, these studies show that the EITC is complex and not necessarily understood by individuals, and that behavior can change de-

pending on the amount of knowledge and advice.

The Child Tax Credit (CTC) is another complex system in the United States. Like the EITC, the CTC changes according to income, with potential regions of increase, constancy, and decrease. Furthermore, the CTC is a separate system from the EITC, and the coexistence of two similar systems makes the overall system complex. Feldman, Katuščák, and Kawano (2016) demonstrated household misperceptions using a regression discontinuity design based on eligibility for the CTC. The CTC has an age limit of 17 for eligible children and income restrictions for eligibility. Therefore, it makes sense to report lower income if the child is under 17, but there is no reason to do so if the child is 17 or older. Feldman et al.'s study showed that even for households with children over 17, some reported lower income, suggesting that they were confused by the complex tax system and made incorrect declarations.

As for the studies I was involved in, Kurokawa, Mori, and Ohtake (2020) showed that some experimental participants made decisions based on the misperception that consumption tax and income tax, which should be equivalent, were not equivalent. However, Mori, Kurokawa, and Ohtake (2022) showed that participants in the experiment did not exhibit behavior related to misperceptions such as the money illusion or tax evasion.

III-3. Retirement Savings and Pensions

Savings for retirement involves a long-term decision and is a very difficult decision to make due to various risks. Nevertheless, individuals do not devote enough time to decision-making about retirement savings and tend to use heuristics or rules of thumb (Benartzi and Thaler 2007). For example, round numbers like 5% or 10%, the maximum amount that can be saved, and the maximum amount with a match from the company are used as rules of thumb for the contribution rate to retirement savings. Also, in choosing where to invest retirement savings, some people use the “1/n rule,” which involves distributing investments evenly among available funds.

Various incentives, such as grants and tax deductions, are used to promote retirement savings. However, such incentives do not always function as intended (Chetty 2015). Chetty et al. (2014) examined the effect of retirement savings grants in Denmark and found that only about 1% of grant expenditures increased savings. The paper estimates that 15% of people react to grants and change their retirement savings, while the remaining 85% do not react.

Thinking about retirement savings can be difficult, and due to various reasons, including present bias and procrastination, the initiation of savings is often postponed. In the context of retirement savings, it is known that the enrollment rate can be significantly improved by default settings. Madrian and Shea (2001) demonstrated the impact of default settings on the 401(k) defined contribution pension system in the United States. This study examined changes in participation rates and other factors when participation in the 401(k) became the default at a large U.S. company. Due to this default setting, the participation rate surged

from 37.4% to 85.9%. Moreover, the default contribution rate was set at 3% and the default investment option was the MMF (Money Market Fund), and many employees chose to stick with these default settings. The increase in retirement savings due to default settings has been confirmed by various subsequent studies for its strong impact (for a detailed survey, see Beshears et al. 2018).

While default settings improve participation rates, there are issues such as fewer learning opportunities and the fact that defaults do not necessarily reflect the optimal choice that reflects individual preferences. The active decision method, which mandates some choice, is a system that falls between voluntary enrollment and default setting. Carroll et al. (2009) examined the impact of the active decision method on participation rates and other factors in U.S. 401(k) enrollment. The active decision method increased the participation rate from about 40% to about 70%. While this increase did not match the default setting, it had a significant effect. Furthermore, the decrease in the average contribution rate due to the active decision method was smaller compared to the default setting.

Understanding when and how taxes are levied on pensions, and how to respond to this, is a difficult area for individuals to comprehend. Beshears et al. (2017) examined the impact of a policy change that eliminated the typical income deduction at the time of contribution and instead taxed the contribution amount, while making the amount received at the time of withdrawal tax-free. According to standard economic models, this policy change should not affect the real amount of contribution. However, the study found that it led to an increase in contribution amounts. This suggests that individuals may have been confused about the tax system related to pensions.

Deciding how to build a pension is a difficult issue, as is determining when to start receiving a pension. To correctly solve this problem, one must understand the differences in the amount received due to the pension's start date, predict the duration one can work and one's life expectancy, and grasp one's own and family's income and asset situation. Solving this problem is realistically impossible, and it's reasonable to assume that actual individuals use some form of heuristics to make more simplified decisions.

Seibold (2021) conducted a study using data from Germany, demonstrating that people make retirement decisions using the "statutory age" as a reference point. Using bunching estimation, the study showed that the density of retirement age is very high around the three statutory ages set by the German pension system. These statutory ages sometimes make financial sense for retirement, but the density of retirement age is high even for statutory ages that don't make financial sense from a monetary incentive perspective. To explain the latter, it was suggested that people are deciding their retirement age using the statutory age as a reference point. Indeed, this statutory age was framed as "standard" and emphasized in brochures.

Behaghel and Blau (2012) similarly showed that the "Full Retirement Age" set in the United States serves as a reference point. They verified this by taking advantage of the gradual increase in the Full Retirement Age from 2004 to 2009. Despite the lack of a strong economic incentive to retire at the Full Retirement Age, many retirements occur at this age.

III-4. Tax Compliance Promotion

It's crucial in tax practice to ensure that citizens properly pay their taxes and prevent delinquency. There are instances of tax evasion and non-compliance with tax regulations. Based on standard economic models, the only ways to increase the tax payment rate are to raise the probability of discovering tax evasion or to increase the penalties when evasion is discovered (Allingham and Sandmo 1972). However, using nudges may raise the tax payment rate at low cost without having to increase monitoring costs or penalties.

Hallsworth et al. (2017) conducted a large-scale field experiment in the UK to test whether emphasizing social norms would increase the tax payment rate. This can be considered a type of social comparison nudge. In this experiment, one of the following messages was added to the documents urging tax payment that were sent to those with unpaid taxes:

- A. Nine out of ten people pay their taxes on time.
- B. Nine out of ten people in the UK pay their taxes on time.
- C. Nine out of ten people living in the UK pay their taxes on time. You are currently in the very small minority of people who have not paid us yet.
- D. Paying taxes means we all gain from vital public services like the NHS, roads, and schools.
- E. Not paying taxes means we lose out on vital public services like the NHS, roads, and schools.

Message A, B and C emphasize that the recipient is part of a minority, tapping into the human desire to align with majority behavior. Message B aims to emphasize the message by specifying a location, while message C further underscores the point of being in a minority. Message D and E highlight the consequences of paying taxes. Message D is a gain-framed message, while Message E is loss-framed.

The results of the field experiment showed that the most effective message was message C, which emphasized being part of a minority. This led to a 5.1 percentage point (0.1 standard deviation) increase in the tax compliance rate compared to the control group. The effect of the other messages ranged from 1.3 to 2.1 percentage points. Although the effect size was not particularly large, the simple intervention of tweaking the message led to an improvement in tax compliance. This suggests that the intervention offered high cost-effectiveness.

Castro and Scartascini (2015) conducted a similar experiment in Argentina with property taxes. They tested three types of messages: one detailing the costs and penalties for failing to pay taxes, one explaining how tax revenues are used, and one emphasizing that those who fail to pay taxes are in the minority. Additionally, each message was accompanied by an image. The results showed that the only effective message was the one detailing the costs and penalties for non-payment. This message, which was about costs and penalties, is not about a psychological effect but about incentives. However, it can be considered as a type of infor-

mation-providing nudge, in the sense that it emphasizes already-existing incentives.

III-5. Other Topics

Insights from behavioral economics are also being applied in fields related to benefits such as labor, education, and healthcare. Here, we will briefly summarize those insights.

In the field of labor, unemployment insurance benefits are a significant issue. From the perspective of the provider, it would be desirable to reduce unemployment insurance benefits as much as possible by getting job seekers to find employment as quickly as possible. However, job seekers have various biases that seem to influence the lengthening of their unemployment period. Mueller, Spinnewijn, and Topa (2021) asked job seekers about the probability of finding a job in the future and checked how consistent this was with the actual proportion who found jobs. The results showed that job seekers tend to overestimate their chances of finding a job, a bias that leads to longer periods of unemployment. Additionally, DellaVigna et al. (2017) showed that reference dependence and present bias affect job-seeking behavior. Furthermore, recent attempts have been made to increase the probability of job placement through “nudges” for job seekers. Altmann et al. (2018) have examined the effectiveness of pamphlets demonstrating job hunting strategies and the consequences of unemployment, aimed at increasing motivation for employment. While the overall effect was minimal, it was found to be effective for job seekers at high risk of long-term unemployment.

In the field of education, benefits are provided in various forms, such as scholarships. However, the complexity of educational systems and procedures seems to hinder the actions of (potential) applicants. Bettinger et al. (2012) conducted a study in the United States, where the scholarship system is complicated. They showed that assistance and information provision in financial aid applications increased application rates and college graduation rates. Also, Dynarski et al. (2021) demonstrated a significant increase in application and enrollment rates due to the removal of uncertainty about scholarship receipt, the abolition of eligibility conditions, and default settings for scholarship receipt.

In the field of healthcare, benefits are provided in various forms, such as public health insurance systems. However, health insurance systems are challenging to understand, which might distort patients’ actions. Baicker, Mullainathan, and Schwartzstein (2015) identified problems caused by patient behavior errors in health insurance as “behavioral hazards” in contrast to moral hazards, which helped clarify the discussion. Many studies, such as Heiss et al. (2021), have pointed out mistakes in patient behavior in American health insurance.

IV. Optimal Taxation and Behavioral Economics

Optimal taxation theory has long been an area of analysis in public economics and continues to have significant influence in designing tax systems. For example, Ramsey (1927) has had a considerable impact in discussing optimal linear commodity taxes, while Mirrlees

(1971) discussed optimal nonlinear income taxes (Mankiw, Weinzierl, and Yagan 2009). These theories are constructed based on standard economic models. In other words, it is assumed that consumers can make consistent long-term decisions without present bias, and are not inattentive to taxes, being able to make decisions that incorporate all taxes.

In recent public economics, theories have been constructed assuming that consumers may not be able to make optimal decisions in some sense. Non-optimal behavior refers to instances, as discussed before, where individuals make decisions that greatly discount future utility due to present bias or make decisions that ignore taxes due to inattention. For example, Chetty, Looney, and Kroft (2009) discuss the problem of tax incidence when consumers do not behave optimally.

There are various studies on models where consumers cannot behave optimally (e.g., Mullainathan, Schwartzstein, and Congdon 2012). We will introduce the main points of the most recent and general model, the Farhi and Gabaix (2020) model. In this model, consumers have true utility (experienced utility), and welfare is judged by this. However, what consumers use for decision-making is decision utility, which is subject to some bias. In standard consumer theory, consumers decide their consumption allocation such that marginal utility equals price. However, if consumers are unable to make optimal decisions, then marginal utility and price do not necessarily match. This difference between marginal utility and price is referred to as a “behavioral wedge.” The existence of this behavioral wedge means that the change in consumer welfare in response to a price change is different from what would be predicted by standard economic models. The behavioral wedge can be decomposed into a component attributable to a misperception of one’s own preferences and a component attributable to a misperception of price. Farhi and Gabaix derive formulas for commodity taxes (Proposition 1; Behavioral Ramsey Formula) and Pigouvian taxes (Proposition 2; Behavioral Pigou Formula) considering such a behavioral wedge. For Pigouvian taxes, they can be used to address not only externalities but also “internalities”, the negative effects on oneself. Furthermore, they define a “nudge” as something that changes decision utility without changing the price and derive a formula for the optimal nudge (Proposition 3; Optimal Nudge Formula).

Farhi and Gabaix have constructed a general theory of optimal taxation incorporating behavioral economics and presented five concrete examples.

The first example is an application of the inverse elasticity rule for commodity taxes. The inverse elasticity rule suggests that the commodity tax should be set inversely proportional to the price elasticity of demand. What Farhi and Gabaix propose is that, in addition to price elasticity, if there is inattention to tax, the tax rate should be increased as the degree of inattention to tax increases (i.e., as the attention parameter m decreases). This can be interpreted as a rule that, just like increasing the tax rate on goods with low elasticity, we should increase the tax rate on goods that receive less attention and have a smaller response to price.

The second application is related to Pigouvian taxes. Pigouvian taxes are designed to address externalities arising from consumption by imposing a tax according to the externality.

What Farhi and Gabaix propose is that, in addition to the externality, if there is inattention to tax, the tax rate should be increased as the degree of inattention increases. This can be interpreted as a rule stating that while Pigouvian taxes should be levied to internalize externalities, if there is inattention, the response to the Pigouvian tax will be poor, and therefore the tax rate must be raised further to achieve internalization.

The third example is an extension of the first and second examples, adding heterogeneity in the degree of inattention. When there is heterogeneity in the attention parameter m , the optimal tax rate decreases as the variance of m increases. This is because a larger variance in m results in a larger error in the distribution of goods. Pigouvian taxes no longer serve to achieve the first best, and in some cases, quantity restrictions may be preferable.

The fourth example pertains to redistribution issues. As mentioned earlier, Pigouvian taxes are effective not only for addressing externalities but also for mitigating internalities. However, if the problem of internalities occurs more often among the poor (for example, poor people consume more tobacco), this imposes a larger tax burden on the poor, leading to issues of redistribution. In this case, “nudging” could potentially be a more effective measure than taxation.

The fifth example relates to discussions on nonlinear income tax. When one of the marginal tax rates in the tax system is conspicuously noticed while other marginal tax rates are ignored, it is necessary to lower the highest marginal tax rate. Also, if poor people are unable to understand the future benefits from work, a negative income tax becomes optimal. Similarly, Lockwood (2020) showed that if poor people exhibit present bias, the income tax rate should be lowered, and particularly for low-income earners, the optimal tax rate could be negative. This is because, in the presence of present bias, future income is undervalued, and the immediate cost of work is overvalued, which should be considered when setting the optimal tax rate.

V. Implications for Japan’s Tax and Benefit Policies

V-1. Consumption Tax

In Japan, the Consumption Tax Act was implemented in 1989. For some time after the introduction, there were no specific restrictions on how the consumption tax should be displayed, and it was permissible to show prices without tax. This could be described as a situation that tolerated inattention to the consumption tax. Fifteen years after the introduction of the consumption tax, in 2004, it became mandatory to display prices including tax. This could be seen as eliminating inattention to the consumption tax. In 2014, along with a tax increase from 5% to 8%, the obligation to display the total amount was temporarily relaxed as a special measure³. This special measure ended in 2021, and the obligation to display the

³ Ishida and Nakazono (2022) use this 2014 system change to verify the effects total amount display has on consumers. The results of the analysis reveal that demand increases as a result of easing the total amount display, and that this increase is occurring among consumers with lower levels of education.

total amount was reinstated.

As mentioned in Section IV, it is not self-evident whether it is necessary to eliminate inattention to taxes. If there is inattention to taxes, there is an advantage in that it is possible to raise tax revenue without distorting consumer behavior, even if taxes are imposed. However, there is a disadvantage in that the distribution of goods that should change when taxes are imposed does not change, and an error in consumption distribution occurs (Goldin 2015). Whether to make it mandatory to display the total amount requires consideration of these advantages and disadvantages. However, there is a point of debate about whether it is socially acceptable or ethically correct to increase tax revenues by exploiting tax inattention. For example, it might be inconsistent to demand clarification of shipping fee display in the Act on Specified Commercial Transactions, while it is permissible to not clarify the display of consumption tax.

In the case of the consumption tax in Japan, the tax rate was raised from 8% to 10% in 2019, and in conjunction with this, a reduced tax rate system was introduced that maintained the tax rate at 8% for food and drink and newspaper subscriptions. This has further complicated the consumption tax. There was lively discussion about the application of the reduced tax rate, such as the difference between dining in restaurants and the non-application of the reduced tax rate for takeout, before and after the implementation of the reduced tax rate. However, this discussion has largely disappeared now. Various analyses have been made domestically about the effect of the reduced tax rate. However, these analyses do not consider inattention to the reduced tax rate. Especially when total amount display is not mandatory, there is a possibility of misrecognizing that the original consumption tax is applied. In this case, the distortion in consumption distribution may remain at a high tax rate even for goods subject to the reduced tax rate.

The reduced tax rate is implemented as a support measure for low-income earners, who are said to have a high proportion of food expenses in their living expenses. However, using a complex system like a reduced tax rate to provide support may make it difficult for beneficiaries to understand. If government support becomes inattentive due to its complexity, even if it is effectively providing support, there is a possibility that it will not be recognized as support from the perspective of taxpayers.

V-2. Spousal Deductions

Spousal deductions (and special spousal deductions) are systems that allow for income deductions when one has a spouse with no income or low income. The amount of these deductions is determined based on income conditions related to the individual and their spouse. In addition, there are income thresholds for joining social insurance and receiving spousal allowances paid by companies. Generally, these thresholds are referred to as “walls” like the “1.03-million-yen wall”, and it is recognized that the tax rate significantly changes around these thresholds. However, the special spousal deduction decreases gradually according to annual income, so the tax rate does not necessarily change dramatically. Of

course, there are “wall” elements such as joining social insurance and receiving spousal allowances, but it can be said that there are parts where people’s perception diverges from the actual system design.

Yokoyama (2018) used the changes in the spousal deduction system in 2004 to verify the impact on women’s labor supply. The analysis showed that the density of income around the “1.03-million-yen wall” has increased due to the system change. Citing Chetty, Looney, and Kroft (2009), Yokoyama argues that this increase in density may be the result of increased awareness of the system due to the system change.

What is considered a “wall” in the spousal deduction is not really a wall in terms of the system, but even recently, workers’ behavior seems to be based on this wall. This could be because the threshold that has spread in society is functioning (perhaps inadvertently) as a reference point, and people might feel a loss when they exceed this threshold.

V-3. Pension System

The “first tier” of the pension system in Japan is the National Pension, which all citizens are required to join. From a behavioral economics perspective, this can be seen as a paternalistic system based on the premise that it is difficult for people to save due to cognitive biases such as present bias. The “second tier” of the pension system is the Employee Pension, which employees and public servants join (recently, part-time workers are also encouraged to join). Because one is forced to join if they are employed, this can also be considered a paternalistic system.

As for the issue of assets in old age, the importance of individual asset accumulation and its environment is being emphasized recently, and proposals such as the enhancement of tax preferential systems like NISA and iDeCo, and the improvement of financial literacy⁴ are being made. Moreover, starting from the 2022 academic year, asset formation will be studied in home economics classes in high school.

While it is certainly important to enhance systems and improve financial literacy, the effectiveness of these efforts is questionable from a behavioral economics perspective. As mentioned in section III-3, people’s responses to subsidies for pension savings are small, and the segment of the population that responds to subsidies is limited. It is not easy to understand and use systems like NISA and iDeCo well, and it will likely be difficult to cover a large portion of the population. Moreover, even if financial literacy education helps people understand the importance of saving for their retirement and deepens their understanding of financial products, whether they can save due to various factors such as present bias is another issue.

If there are concerns about behavioral economic problems related to savings after retirement, it may be necessary to consider more paternalistic measures. The public pension por-

⁴ In the research I was involved in, we found that while high financial literacy positively correlates with awareness of asset formation, a beneficial aspect, it also positively correlates with high-risk investment and excessive debt, a negative aspect (Kawamura et al. 2021). Therefore, when improving financial literacy, care should be taken with the content of the education.

tion (National Pension and Employee Pension) is already regulated in a paternalistic way, so it might be worth considering enhancing this portion. However, this could be difficult considering the strained pension finances and the potential for further increases in social insurance burdens. If this is difficult, then stronger intervention is needed in the parts that are currently optional. For instance, one could consider interventions based on libertarian paternalism, such as default settings or active decision methods, for joining corporate defined contribution pension plans. There is empirical evidence from examples in countries like the United States that these approaches can have a strong impact, so they are worth considering.

A thoughtful setting of standard retirement and pension commencement ages is also necessary. In Japan today, public pension benefits generally start at age 65 and the remaining life expectancy from the start of receipt is quite long. A system design that allows people who are healthy and able to work longer is needed. As we saw in Section III, people may decide their retirement and pension start ages based on the statutory age. In Japan as well, quite a small fraction of people are postponing their receipt of the Employee Pension until they are 66 or older. Considering that older people do not decide their retirement timing solely on their own but are influenced financially and psychologically by various systems such as pensions, a careful system design that takes this into account will likely be required.

V-4. Policies for Low-Income Individuals

Japan also implements policies for low-income individuals, including the public assistance system. As mentioned in II-5, income correlates with cognitive ability, and people with low income may be more susceptible to various biases addressed in behavioral economics. It is believed that there is a need to more effectively utilize taxation and benefit policies based on insights from behavioral economics, as discussed so far.

Negative income tax has long been discussed as a means of redistributing wealth without harming the work motivation of low-income individuals. As mentioned in Section IV, even assuming workers' cognitive biases, negative income tax could potentially be optimal. It could be revisited from this new perspective of cognitive bias.

However, its introduction requires caution. In the United States, the complexity of the EITC system is an issue. As mentioned in III-2, due to this complexity, there is a possibility that the EITC is only effectively utilized by those who can understand the system. When introducing it in Japan, how to deal with this complexity could be a problem.

Furthermore, insights from behavioral economics can also provide suggestions for the public assistance system. In Japan, illegal receipt is often discussed in the context of the public assistance system, but there are also issues of people who should be receiving benefits not doing so, known as the "missed receipt" problem. For example, there are various requirements for receiving public assistance, and it is known that the application process is difficult. It might be necessary to revisit these issues of application complexity from the perspective of behavioral economics. Also, there is a mention of the psychological cost (stigma) associated with receiving public assistance. As mentioned in II-2, people may derive utility

from various beliefs beyond consumption. A system design that takes such utility into account will likely be necessary.

VI. Conclusion

In this paper, I conducted a survey of research incorporating insights from behavioral economics into tax and benefit policies studied in public economics. Research on behavioral economics, which began in the 1970s, was conducted using various methods, from experimental studies in laboratories to analysis using field data, revealing the extent to which human behavior deviates from standard behavior. The application of insights from behavioral economics to tax and benefit policies spread rapidly from around 2010, and by 2023, it can be said to have established an important position. The insights gained from these studies have important implications for the practice of taxation and benefits and are expected to have a strong influence on policy in the future.

Although research on the behavioral economics of taxation and benefits has progressed in the last decade or so, unfortunately, it is difficult to say that Japanese research has contributed to this progress. Through writing this paper, I realized that my own knowledge is not keeping up. In the future, it will be necessary for various researchers to enhance their understanding of the behavioral economic aspects of taxation and benefits. Moreover, research using field data, especially administrative data, can be said to be lagging. The use of administrative data is essential for analyzing taxation and benefits, and I hope that its use will advance in the future.

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