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Compensation for Regulatory Takings in the Virtual Absence of Constitutional Provision: The Case of Korea[1]

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Although there is a large literature on when compensations are justified for regulatory takings, empirical studies are hard to find. This paper presents an empirical analysis of the behavior of regulators concerning compensation in the absence of constitutional requirements using the examples of land use regulations in Korea. We found that compensation is more likely to be offered if those affected by the regulation effectively protest the regulator, if the regulation involves compliance efforts that are difficult to monitor, and if the regime in power is democratic rather than authoritarian.

Key Words: compensation; constitution; regulatory takings; land use regulation; Korea.

I. INTRODUCTION

Government utilizes resources of an economy just as the private sector does. Efficient utilization of resources can be achieved only if their users pay adequate prices reflecting the opportunity cost. In most circumstances, markets take care of this for the private sector. Compensation requirements may perform the same function in the case of government regulation on land use. If government is not

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required to pay adequate compensation for regulatory takings, there is a danger of excessive regulation and hence inefficient utilization of land resources.

The literature on compensation is heavily concentrated on theoretical research on the normative issue of when compensation should be paid (Epstein, 1985; Blume and Rubinfeld, 1987; Miceli and Segerson, 1994; Stroup, 1997). There exist very few empirical studies, including Cordes and Weisbrod (1979), Umbeck (1981), and Fischel (1996). Cordes and Weisbrod (1979) analyzed the behavioral response of government agencies to compensation requirements in the context of U.S. federal highway construction. They showed that the presence of compensation requirements can affect the public agencies' real output decisions. Fischel (1996) presented anecdotal evidence suggesting that government abstains from uncompensated takings when the costs it faces become too large. Umbeck (1981) showed that physical force plays a decisive role in the initial distribution of property rights between private citizens when there is no police protection of property rights. Nevertheless, there has been no systematic research, to the best of our knowledge, which addresses the more important question of what would happen to the distribution of property rights between government and the private citizens in the absence of compensation requirements.

Korean land use regulations provide an interesting case.[2] Article 23-3 of the Constitution does state that expropriation, utilization, and restriction of private property rights for the sake of public interest as well as compensation for such action shall be made according to law, and that compensation shall be fair. In fact, there exists a set of specific legislations that addresses the specifics of compensation for compulsory purchase of private land for public use. Under the authoritarian regimes in power until the 1980s, however, it had been very difficult to challenge government decisions involving expropriation or utilization of private property through a legal process. In the case of most regulatory takings, there was no such legal provision and hence no compensation was offered. Although some appeals had been made to the Constitutional Court, the decision was that the practice of giving no compensation was not unconstitutional as long as there was no specific legislation that spelled out the details of compensation. In other words, the Constitutional provision that no takings are allowed without fair compensation according to relevant law was interpreted as meaning no compensation is required without proper legislation governing the specifics.[3] And many legal experts endorsed such interpretation.[4] Therefore, the situation can be described as virtual lack of constitutional requirements for compensation despite Article 23-3 of the Constitution.

[2]Korea is not unique in that almost no compensation is paid for the "mere" regulation. See Hagman (1978) for an international comparative survey. Nevertheless the United Kingdom paid some compensation despite the absence of a written constitution.

[3]Supreme Court Decision 1976.10.12, Dae-Pan-76-Da-1443.

[4]See Professor Won-woo Suh (1991), for example. To the best of our knowledge, Professor Young Huh (1995) is the only expert in Korea who is in favor of compensation for regulatory takings.

The situation has changed as a result of a Constitutional Court decision made in December 1998 over an appeal filed by owners of land designated as green belts.[5] The Court decided that the article of the Urban Planning Law that forms the legal basis for green belts regulation was unconstitutional because it did not have a compensation clause in it. Subsequently, a special law that included specifics on compensation for the owners of green belt land was legislated in 2000. This development is to a great extent attributable to the recent wave of organized challenges by the Association of Greenbelt Residents. And the urban planning law itself was amended in 2000 to require that compensation be paid to private land designated as the site for urban planning facilities such as roads, parks, schools, water supply, and sewer systems.

With this as background, we seek to analyze the practice of compensation for regulatory takings in Korea. In Section II, we present a theoretical framework for analyzing government decision on compensation for regulatory takings from a public choice perspective. Section III provides an overview of major land use regulations implemented in Korea together with compensation practices. In the next two sections, we first identify those regulations for which compensation is justified on theoretical grounds, and note that compensation is actually offered to only some of them. We then conduct an empirical analysis to find the factors that affect government decision of whether or not to offer compensation. Section VI concludes the paper.

II. THE CONCEPTUAL FRAMEWORK

In this section, we want to derive a set of hypotheses concerning the behavior of government officials towards compensation for regulatory takings. More specifically, we are interested in identifying the conditions under which the regulators are likely to offer some compensation to those affected by the regulations, building on the public choice literature.

Government has two types of instruments at its disposal to carry out its duties, i.e., regulations and budget. And a proper combination of the two types of instruments is likely to be attained when policy makers are made to face the social costs associated with their action. Compensation operates as a mechanism ensuring this to happen, and is therefore socially desirable. In reality, however, rational public servants would try to avoid offering compensation because it is costly to them.

Compensation for regulatory takings is an example. Policymakers prefer regulations with no compensation to those that entail compensation. A main reason is that government needs to mobilize funds, mainly through taxation, and this requires additional efforts to deal with the public's discontent. On the other hand,

[5]97Hun-Ba-78. Green belts are a regulation that prohibits development on the designated land. See Kim and Kim (2000) for a detailed description.

the only benefit to government is a successful implementation of the regulation. A simple cost–benefit calculation would favor takings with no compensation, or the smallest possible amount if compensation must be paid at all. In other words, the likelihood that compensation will be offered decreases with the amount of compensation.

Government officials will take the same position concerning projects that generate negative spillover effects. Government is often in charge of providing the so-called NIMBY (or LULU) facilities which impose substantial costs upon the inhabitants nearby. If these costs are not reflected in the decision-making process there will be an excessive provision of such facilities. And for the reason explained above, policymakers will try their best to avoid paying costly compensation to the potential victims.

The existence of such situations might require some reinterpretation of the theory of budget-maximizing bureaucrats. According to this theory, civil servants try to maximize their own private satisfaction rather than social welfare (Wintrobe, 1997; Moe, 1997). They derive utility from power and influence, promotion opportunities, and working conditions as well as salaries and benefits. Since a large budget delivers these benefits, bureaucrats will try to maximize the budget (Niskanen, 1971). If this theory were interpreted literally, it would predict that government officials would prefer offering compensation for restricting private property rights because funds spent on compensation are a part of their budget. This is inconsistent with the behavior of government officials toward compensation we described above.

Perhaps the discretionary power the bureaucrats can exercise might be more important than the sheer size of the budget (Migue and Belanger, 1975). Budget maximization is costly to the bureaucrats. A larger budget requires larger tax collection, and this can be met with resistance from the public. Therefore, bureaucrats' attempt to maximize budget will be subjected to a political constraint. They will try to increase the size of the budget up to the point where the marginal benefit from the incremental budget is equated with the marginal cost of raising additional revenue through taxation. But the benefit associated with the budget of a given size will be the greater, the larger the discretionary power over the use of funds. Since there is little room for discretion over the budget earmarked for compensation for regulatory takings, it makes perfect sense that bureaucrats are not keen on increasing the size of this particular budget item.[6]

[6]It is true that there is some room for discretion over some aspects of compensation. Bureaucrats might be given some discretionary power over the assessment of the amount of compensation to be paid, and interpretation of legal provisions on compensation that are ambiguous. Although some benefit might be derived in such cases, it is not likely to lead to the budget-maximizing behavior of bureaucrats in Korea. This is because most of such benefits accrue to local government officials while it is the responsibility of central government officials and lawmakers to legislate compensation requirements for regulatory takings. To them, compensation is an obvious burden that provides no clear personal benefit.

So far we have emphasized the fact that the regulators tend to dislike offering compensation because they derive no private benefit from doing so. However, compensation requirements can be legislated if potential beneficiaries of compensation provide private benefit to the lawmakers, or force them to pay the price if they do not introduce the legislation. The former might involve organized lobbying and bribery, whereas the latter can take the form of organized rallies to press the lawmakers into adopting such legislation. We focus our attention on the latter because it is more readily observable.[7]

Attempts to block a regulation can take several forms. Those affected by the regulation could refuse to comply with it if government cannot monitor its compliance; they could utilize the media that might be sympathetic to them in opposing the regulation; they could even resort to physical force such as demonstration to deter its implementation. Faced with these attempts by the victims of regulatory takings, government officials might as well offer some compensation just to ensure that the regulation will be implemented.

In summary, we hypothesize that compensation is less likely to be offered when a larger amount of funds is required, and more likely to be offered when those affected protest the regulation and the regulation involves compliance efforts that are difficult to monitor. In the next section, we test this hypothesis using data on 21 major land-use regulations being enforced in Korea.

III. LAND-USE REGULATIONS AND COMPENSATION PRACTICES IN KOREA

Land use in Korea is heavily regulated by the central government. Conversion of agricultural land and forests into urban uses, construction of buildings in an urban area, and redevelopment of existing buildings are all governed by regulations set largely by the central government in collaboration with the National Assembly. The decision as to whether or not compensation will be offered for the "mere" regulation[8] is no exception. Provincial or local governments play

[7]The potential beneficiaries of compensation would prefer protesting against noncompensation to bribing the lawmakers to facilitate legislation of compensation requirements. One can think of a few reasons for that. First, bribery is an illegal act and is not approved by the general public. Protesting can be more effective in raising the issue and drawing the attention of the media and the general public. Second, bribery is more costly than protests. To be able to affect the collective decision of the legislative body, the potential beneficiaries of the legislation must engage a large number of lawmakers, and hence financially costly. Moreover, whoever is involved in the act of bribery is sure to be indicted if caught, while those involved in a demonstration protesting against a no-compensation policy are likely to suffer from minor penalties as responsibility is shared among the participants in the demonstration.

[8]"Mere" regulation in the context of zoning is the regulation that "restricts land use . . . without any hint of governmental acquisition." Hagman (1978, p. 256).

only minor roles such as implementation or submission of proposals for zoning changes on the parcels of land located in their own jurisdictions.

The various land use regulations being enforced in Korea can be grouped into two categories. The first category, into which the vast majority of regulations fall, applies to the construction of physical structures on land. It is quite easy to monitor violations of these regulations. The second category includes performance regulations, whose violations are much more difficult to detect. We will see that no compensation is paid for those affected by the first category of regulations whereas compensation is offered for some regulations belonging to the second category.

Let us start with the first category. Consider the regulations imposed upon those plots of land that are designated as the sites for urban planning facilities (UPF) mentioned earlier. A peculiar practice in Korean urban planning is that plots are designated as UPF far ahead of actual implementation of the plan. Once a parcel of land is declared to be the site for UPF, its use is frozen at the existing one, but the planned facilities may not be installed for 5 or 10 years in many cases. There are some plots designated for the sites of such facilities during the Japanese occupation (1910–1945) and no action has been taken on them for more than 50 years. No compensation had been paid for land taken this way until the revised Urban Planning Law of 2000 introduced a clause of inverse condemnation for those parcels on which no action had been taken for more than 10 years since initial designation.[9]

Another medium of taking is through zoning regulations. The entire land area of Korea is classified into agricultural land, forests, and urban areas, and each category of land is subjected to a different regulation. Agricultural land, which composes 22% of the whole territory, is zoned into agriculture promotion zones (APZ) and general farmland. Those contiguous parcels of land that are suitable for mechanized farming are designated as APZ and comprise about 50% of the entire agricultural land. Most nonagricultural facilities are prohibited in APZ, and therefore conversion of those plots of land to urban use is very difficult. General farmland may be converted to urban use, but only through a tough approval process. No compensation is paid to the owners of agricultural land prohibited for conversion into urban uses.

Forests compose 67% of the national territory and are classified into protected forests and general forests. Both types of forests are subjected to regulations making conversion into urban use quite difficult, but the first type is more strictly regulated. No compensation is given to owners of either category.

Most major urban centers in Korea are surrounded by green belts, which make up 5.4% of total land area. About 61% of green belt land is forest, 25% is agricultural land, and the remainder is in residential or mixed uses. Conversion of green belt land into urban use had been almost entirely prohibited since they

[9]Article 40, Urban Planning Act of 2000. This provision will take effect from November 2002.

were first designated in the early seventies, but no compensations was given to owners of green belt land. Then a provision of inverse condemnation was introduced for those resident–owners who had been living in the green belt from the beginning,[10] following the 1998 decision by the Constitutional Court discussed in Section I.

Each plot of land inside the urban planning area (UPA) is zoned into one of the following four categories: residential, commercial, industrial, and preserved green zones. For the first three zoning categories, regulations on the type of development and density apply. No compensation is given to the regulated. On the last zoning category, private development is severely restricted while public projects are generously accommodated.[11] And no compensation is offered to the owners of the land affected.

Some parts of the urban planning area are subjected to another layer of zoning designation such as natural beauty zone, built sight protection zone, and urban design zone. No compensation is offered for any of these zoning categories.

A variety of stringent development control measures applies to the National Capital Region which consists of Seoul, the capital city, Inchon, a port city about 25 miles west of Seoul, and the Kyung-gi Province surrounding them. No compensation is paid for these regulations. Those areas that lie close to the southern boundary of the Demilitarized Zone and the parcels of land located within 1 km distance of military bases are zoned as military facilities protection zones. These plots are subjected to strict density control and land-use regulations by the military authorities without any compensation.

The first category of land use regulations explained so far apply to the construction of physical structures. There are many other regulations which we classify as the second category. Extracting plants and catching wild birds and animals are prohibited respectively in the ecology protection areas (EPA) and birds and beasts protection areas (BBPA). Discharge of wastewater is regulated in special zones for water quality protection (SZWQP) and water supply source protection

[10]Article 17, Green Belt Designation and Management Act of 2000. A right to inverse condemnation is granted to the resident–owner whose land has become almost obsolete because it was designated as green belts. Government should purchase the land within five years from the date the application of inverse condemnation is filed by the owner. This provision became effective from July 2000.

[11]Regulation of land use is twofold; density and type of building. As for the former, the floor-area ratio (FAR) is limited to 200% for the preserved green zones while the ceilings for the residential, commercial and industrial zones are 700%, 1,500%, and 400%, respectively. As for the latter, the details of the regulation are too complicated to explain in this paper (see Article 54, Urban Planning Act of 2000). The most important regulation is the ban on apartment complex, the dominant form of residential development. On the other hand, large apartment complexes can be constructed in the preserved green zones through the "public sector land developments" projects executed by the state enterprises, because the preserved green zones are converted into residential zones at the same time. In other words, the preserved green zone serves as the reserve of land for future public sector land development. Some details have changed as the Urban Planning Act is being replaced by the Comprehensive Territorial Planning Act to take effect in 2003.

areas (WSSPA), although some building regulations apply at the same time. Even though some regulations of water pollution apply to most land areas in Korea, they are stricter in such special areas. Activities that are deemed harmful to the protected cultural heritage are banned in cultural heritage protection areas (CHPA), which cover areas located within 20 to 50 m of the cultural heritage. Owners of traditional buildings located within a traditional building protection area (TBTA) are required by law to maintain the existing structures. Various types of in-kind compensation are offered to the residents in the above non-structure-related zones. For example, funds are given to finance the construction of community centers in the SZWQP and WSSPA and subsidies are provided to the owners of traditional buildings in the TBTA for the maintenance of their properties.

IV. THE MODEL AND THE DATA

Out of the many regulations described in the previous section, the sample of our empirical analysis includes only those for which compensation is justified on theoretical grounds. For this purpose, we included those regulations that are deemed to confer positive externalities (benefits).[12] On the other hand, we excluded those regulations for which compensation is implicitly paid, i.e., those whose benefits emanating from the regulation accrue collectively to the regulated (Epstein, 1995, 134–137). We exclude such regulations because (implicit) compensation is not the result of a separate governmental decision but rather an inherent part of the regulation. Regulations pertaining to residential zones belong to this category. We also excluded regulations aimed at preventing harmful externalities, because no compensation is justified for them since they represent a legitimate use of police power, and also because those affected by the regulation will not dare to ask for compensation even though the constitutional provision of compensation is strictly enforced. Regulations pertaining to the commercial and industrial zones in the urban planning area fall into this category.

One could argue that the purpose of those regulations included in our analysis aimed at protecting military facilities, the ecology, wild birds and beasts, water supply sources and quality, cultural heritage, and traditional buildings is to control harmful externalities on the neighboring plots of land, too. However, the distinction between the negative and positive externalities is not so straightforward. Ellickson (1973, 728–733) and Fischel (1995, 176–177, 351–355) suggest the "normalcy" of the behavior that the regulation seeks to suppress as a basis for justifying compensation. No compensation is justified if the regulation is to

[12]All externalities land use regulations address are technological, as opposed to pecuniary externalities.

suppress harmful (negative externalities) behavior (subnormal), whereas compensation is justified if it is to extract beneficial (positive externalities) behavior (supernormal). Because the regulations described above are extremely strong and targeted only to some specific areas, we conjecture that the required behavior is supernormal, i.e., a legitimate object of compensation. In summary, our sample consists of 21 regulations that aim at conferring or preserving positive externalities.

Since we want to identify the factors that affect government decisions on whether or not to provide compensation for regulatory takings, a discrete choice model needs to be employed. The dependent variable COMPENSATE is a dichotomous variable which takes a value of 1 if some compensation is paid and 0 if no compensation is paid. Compensation is paid for 8 out of the 21 regulations analyzed. A richer analysis would be possible if we had data on the size and the type of compensation rather than just whether or not compensation is provided at all. In fact, both cash payments and in-kind compensation are offered and the choice of the exact compensation package varies across regulations and projects, and it would be interesting to see when cash compensation is preferred or vice versa.[13] Unfortunately, detailed data on compensation are not available.

We consider several explanatory variables: COVERAGE, SEVERITY, MONITOR, PROTEST, CHRONOLOGY, and ALL. Only COVERAGE is a continuous variable; all others are categorical variables. Table I summarizes the values of the dependent and independent variables for each regulatory takings considered. In cases where compensation was institutionalized after some time had passed since the regulation was first introduced, the regulation was treated as if it were two separate regulations depending on whether compensation is paid. Table II presents the correlation matrix of explanatory variables.

COVERAGE represents the size of the physical land area affected by a regulation.[14] In most cases, the exact data on COVERAGE are available. On the other

[13]Except in the case of outright purchase of property being affected by particular projects, Korean government officials appear to prefer offering in-kind compensation to cash compensation. For example, common facilities such as public conference rooms, sports premises or warehouses are built for the community being affected by such projects. This practice is inefficient because the benefits generated by the common facilities are not directly linked to the size of (potential) damage, and could be almost nil to many residents of the community. Moreover, the financial requirements of in-kind compensation might easily exceed the one-off cash compensation. One major reason for the apparent preference for the former is that government fears that new migrants might demand additional cash compensation in the future if they discovered that some cash compensation was paid in the first place. On the other hand, once the common facilities are built, they will continue to exist for both current and future residents to enjoy.

[14]The size of the land area designated for a particular category could be affected by whether or not compensation is required, in which case COVERAGE may not be exogenous. In practice, most regulations considered in the study were introduced initially under the presumption of no compensation. Exceptions are birds and beasts protection areas, traditional building protection areas, and cultural heritage protection areas. However, the second and third regulations are of a minimum size, and the first has had a compensation requirement but no compensation was paid in practice.

TABLE I
Summary of Data

Regulation	COM-PENSATE	SEVER-ITY	COVER-AGE	MON-ITOR	PRO-TEST	CHRON-OLOGY	ALL
Green belts	0	1	5397	0	0	0	0
Green belts	1	1	5397	0	1	1	1
Agriculture promotion zone	0	0	10343	0	0	0	0
General farmland	0	0	9984	0	0	0	0
Ecology protection area	0	0	64	1	0	0	1
Ecology protection area	1	0	64	1	1	1	1
Birds & beasts protection area	1	0	1096	1	1	0	1
Protected forest	0	0	56892	0	0	0	0
General forest	0	0	13110	0	0	0	0
Restricted forest	1	0	3160	1	0	0	1
Site for planned urban facilities	0	1	772	0	0	0	0
Concentration control area, NCR[a]	0	1	2095	0	0	0	0
Growth management area, NCR[a]	0	1	5792	0	0	0	0
Nature conservation area, NCR[a]	0	0	3831	0	0	0	0
Special zone for water quality protection	0	0	2102	0	0	1	0
Special zone for water quality protection	1	0	2102	0	1	1	1
Water supply source protection area	0	0	1257	1	0	0	1
Water supply source protection area	1	0	1257	1	1	1	1
Military facilities protection zone	0	0	2427	0	0	0	0
Growth control zone, UPA[b]	0	1	10900	0	0	0	0
Natural beauty zone, UPA[b]	0	1	41	0	0	0	0
Urban design zone, UPA[b]	0	1	1	0	0	0	0
Built sight protection zone, UPA[b]	0	1	73	0	0	0	0
Traditional building protection area	1	1	1	1	0	0	1
Cultural heritage protection area	1	1	1	1	0	0	1

Note. Total land area of Korea is 99,313 square km.

[a] The National Capital Region consists of the city of Seoul, Inchon, and Kyunggi Province and is divided into these three subzones.

[b] UPA refers to urban planning area, which is an area for which urban planning applies.

TABLE II
Correlation Matrix of Explanatory Variables

	MONITOR	PROTEST	ALL	SEVERITY	CHRONOLOGY
MONITOR	1.0000				
PROTEST	0.3001	1.0000			
ALL	0.8402	0.6124	1.0000		
SEVERITY	−0.2626	0.2417	0.2303	1.0000	
CHRONOLOGY	0.0858	0.7500	0.4082	−0.2417	1.0000

hand, data are not available for three regulations, urban design zone, traditional building protection area, and cultural heritage protection area. Fortunately, they are known to apply to very small areas, much smaller than one square km. We therefore assign a value of 1 to them.

COVERAGE is expected to carry a negative sign for a couple of reasons. First, the larger the area affected by a particular regulation, the larger the number of people involved. Consequently, it will be more costly for those affected to organize themselves into concerted action because of the free-rider problem. Second, the larger the area, the larger the amount of required compensation will be. This means that government is less willing to institutionalize compensation requirements.

To be exact, the amount of compensation should be equal to COVERAGE times the change in the land value before and after the regulation is introduced. Since it was not possible to compute this for all the cases considered in this study, we settle for a discrete variable SEVERITY to approximate the land value differential.

SEVERITY represents the strictness of regulation. The decrease in land value per unit area due to a regulation is larger in locations closer to urban centers. Therefore, SEVERITY was assigned the value of 1 for green belts that surround the built-up areas in major urban centers and other regulations that apply to locations more central than green belts. For all other regulations that apply outside the outer edge of green belts, SEVERITY takes the value of 0.

The theoretically expected sign of SEVERITY is ambiguous. The larger its value, the greater the total amount of compensation will be, if there is any. Therefore, the potential beneficiaries of compensation would have a greater incentive to push the government to legislate compensation. Since the stake is larger, the bondage amongst potential beneficiaries should be stronger than otherwise. On the other hand, government would like to avoid giving out large sums of money in compensation, and hence is likely to be more defensive.

MONITOR indicates whether or not it is sufficiently easy for government to monitor violations of regulations. This variable is assumed to take a value of 1 if it is difficult to monitor violations of the regulation and 0 otherwise. For example, in the case of land use regulations such as green belts that prohibit any

development, it is easy to detect any violation because such violation will produce a visible structure. Of course, the owners of the new illegal structure can resist government attempts to remove it, but it will be costly. On the contrary, for those environmental performance regulations such as regulations on wastewater discharges or extraction of plants, it is much more difficult and costly to detect violations. This means that those subjected to such regulations will be able to impair their successful implementation. Therefore, MONITOR is expected to carry a positive sign, meaning that the larger its value, the greater the probability that some compensation will be legislated.

PROTEST is a variable that takes the value of 1 for those regulations against which there have been demonstrations or organized protests reported in the media, and zero otherwise. PROTEST is expected to have a positive sign for obvious reasons.[15]

CHRONOLOGY is a discrete variable taking the value of 1 if a regulation was introduced after 1988 and 0 if it was introduced before 1988. Government had been much more repressive prior to 1988 and hence less inclined to offer compensation for regulatory takings despite occasional resistance from the victims. The year 1988 marks the end of the authoritarian regime in Korea, and there have been many organized demonstrations against regulations since then. This is verified by the strong correlation between CHRONOLOGY and PROTEST (see Table II). Therefore, the expected sign of CHRONOLOGY is positive.

Finally, ALL is a composite variable that takes the value of 1 if either MONITOR or PROTEST is equal to 1, and 0 otherwise. This variable is used to save degrees of freedom.

V. ESTIMATION RESULTS

Although econometrically correct methods for estimating discrete choice models are Logit and Probit, we estimated a linear probability model using ordinary least-squares (OLS) method as a start. The results are presented in Table III.

The first model has four explanatory variables, SEVERITY, COVERAGE, MONITOR, and PROTEST, and a constant term. Both MONITOR and PROTEST had a positive sign and were significant at the 1% level. The coefficients of the two other variables were statistically insignificant. The adjusted R^2 value was 0.71.

The second model has three explanatory variables. SEVERITY was left out since its theoretical sign is ambiguous. The goodness of fit is similar to that of the first model with an adjusted R^2 of 0.68. Both MONITOR and PROTEST

[15]One problem with including this variable on the right-hand side of the regression equation is that causation is unlikely to be unidirectional. Although government may give in to the protests by the victims of the regulation and legislate a compensation clause, as has been the case of green belts, protests can be the response of the victims to the lack of compensation legislation.

TABLE III
Estimation Results: Linear Probability Models
(Dependent Variable: COMPENSATE = 1 if Compensation Is Offered and 0 Otherwise)

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	−0.0915	0.0418	0.0364	−0.1287	−0.0228
	(0.1089)	(0.0786)	(0.0659)	(0.107175)	(0.0787)
SEVERITY	0.1975			0.1589	
	(0.1165)			(0.1120)	
COVERAGE	2.28e-06	−6.81e-07		3.09e-06	8.13e-07
	(5.15e-06)	(5.06e-06)		(5.01e-06)	(4.86e-06)
MONITOR	0.5128	0.4503	0.4545		
	(0.1256)*	(0.1253)*	(0.1184)*		
PROTEST	0.7399	0.6894	0.6909		
	(0.1390)*	(0.1417)*	(0.1381)*		
CHRONOLOGY				0.2778	0.2408
				(0.1409)***	(0.1418)***
ALL				0.7655	0.7253
				(0.1206)*	(0.1199)*
Adj. R^2	0.7057	0.6794	0.6937	0.7182	0.7415

Note. Figures in parentheses are standard errors.
* Significant at 1%; **significant at 5%; ***significant at 10%.

exhibited the expected sign and were statistically significant, as in the first model. COVERAGE had the correct negative sign, but was insignificant.

The third model has only two explanatory variables, MONITOR and PROTEST. In fact, this model slightly outperforms the second model with an adjusted R^2 of 0.69. Again both MONITOR and PROTEST had a significant positive sign.

The last model reported in Table III has four explanatory variables, COVERAGE, SEVERITY, ALL, and CHRONOLOGY. The variable ALL, a composite of MONITOR and PROTEST, had a positive sign and was statistically significant at 1%. CHRONOLOGY also had the expected positive sign and was significant at 6%. But the coefficients of COVERAGE and SEVERITY were insignificant. This could be attributed to the fact that we had to approximate the total size of compensation by two separate variables, COVERAGE and SEVERITY, instead of the product of the two variables because we did not have data on a concrete measure of severity of the regulations.

Interpretation of the results from OLS estimation is simple and straightforward. Government is more likely to provide compensation if the regulation involves compliance efforts that are costly to monitor, if the victims of the regulation stage organized protests, and if the regime in power is more tolerant and democratic.

Nextly, we estimated a set of logit and probit models. The first model of the OLS estimation could not be estimated using either logit or probit because it had a near singular matrix. Therefore, we estimated models using various combinations of explanatory variables. Logit and probit estimation results are summarized in Table IV and Table V, respectively.

TABLE IV
Estimation Results: Logit Models
(Dependent Variable: COMPENSATE = 1 if Compensation Is Offered and 0 Otherwise)

Explanatory Variables	Model 1	Model 2	Model 3	Model 4
Constant	−0.9387	−0.8825	−2.0636	−0.9623
	(1.0510)	(0.7483)	(1.6473)	(0.2659)
SEVERITY	0.0753		0.4778	−0.0832
	(1.2603)		(1.4062)	(0.9351)
COVERAGE	−0.00036	−0.00036	−4.31e-05	−7.86e-05
	(0.0002)***	(0.00029)	(8.45e-05)	(0.2482)
MONITOR			3.0935	
			(1.4631)**	
PROTEST	41.214	46.982		
	(1.0403)*	(1.1059)*		
ALL				2.5407
				(0.0587)*
Log likelihood	−7.2282	−7.2295	−10.4359	−12.1391

Note. Figures in parentheses are standard errors.
* Significant at 1%; **significant at 5%; ***significant at 10%.

In the first logit model, PROTEST had a significant positive sign, and COVERAGE had a negative sign and significant at 10%. The coefficient of SEVERITY was insignificant. The second model produced a similar result. In the third model, MONITOR had a positive sign as expected and the coefficient was significant

TABLE V
Estimation Results: Probit Models
(Dependent Variable: COMPENSATE = 1 if Compensation Is Offered and 0 Otherwise)

Explanatory Variables	Model 1	Model 2	Model 3	Model 4
	−0.5483	−1.1791	−1.1868	−0.5994
Constant	(0.6068)	(0.8045)	(0.3961)	(0.2378)
	−0.0086	0.2414		−0.05175
SEVERITY	(0.7044)	(0.7174)		(0.9322)
	−0.000195	−2.65e-05		−4.71e-05
COVERAGE	(0.00010)***	(4.58e-05)		(0.2369)
		1.8273	1.8613	
MONITOR		(0.7736)**	(0.6237)*	
	9.6649			
PROTEST	(0.4446)*			
				1.5547
ALL				(0.0626)*
Log likelihood	−7.2081	−10.4314	−10.6563	−12.1595

Note. Figures in parentheses are standard errors.
* Significant at 1%; **significant at 5%; ***significant at 10%.

at 5%. COVERAGE had the expected positive sign but it was statistically insignificant. The coefficient of SEVERITY was insignificant. In the last model, ALL was included as an explanatory variable. The coefficient had the expected positive sign and was significant at 1%.

Estimation results from probit models were quite similar to those from logit models reported above. In all models, PROTEST, MONITOR, and ALL had the expected positive sign and were significant at 1% or 5% levels. COVERAGE had the right sign but it was significant in only one model. The coefficient of SEVERITY was insignificant in all cases.

In summary, estimation results from logit and probit models suggest that government is more likely to provide compensation if the regulation is costly to monitor and if those affected by the regulation protest. Although it is somewhat less clear, compensation is less likely to be given if the regulation requires a large sum of compensation.

The second finding above implies that compensation is more likely to be offered if the regime in power is democratic rather than authoritarian. CHRONOLOGY carried a significant positive sign when it was included in the regression equation, and PROTEST, which is highly correlated with CHRONOLOGY, had a significant positive sign in all cases. This finding contrasts with the conventional view that explains non-compensation as an excess of democracy (Fischel, 1995, 271–273; Epstein, 1985, 263–273). Under an authoritarian regime in Korea, people apparently succumbed to regulations unilaterally imposed upon them by the bureaucrats and the planners. After democratization since 1988, however, those affected by the regulations started protesting against the government. This raised private costs to the regulators, and hence they gave in and offered compensation.

VI. CONCLUDING REMARKS

In this paper we conducted an empirical study on the positive theory of public choice pertaining to the government decision to pay compensation for regulatory takings. Applying a conceptual framework drawn from the theory of behavior of bureaucrats to data on 21 regulations being enforced in Korea, we tried to identify the key factors that determine whether or not government provides compensation for regulatory takings in the absence of a constitutional requirement. The empirical result of our analysis is consistent with the anticipated interaction between government and legislative body (suppliers of compensation) on the one hand and residents and property owners affected by regulatory takings (demanders of compensation) on the other.

To be specific, we found that government is more likely to offer compensation if those affected by regulations protest against the government decision, and if

compliance of regulations is difficult to monitor. On the other hand, compensation is less likely to be offered the larger the extent and size of required compensation. The first finding has an important implication. The increase in protests against government regulations since the more democratic regime took office can be considered rational behavior on the part of the victims of regulations. But such an act of resorting to physical force to press the government to give compensation is socially unproductive and leads to a waste of resources. Therefore, government should establish clear-cut rules concerning compensation and abide by them in order to avoid such social costs and to promote efficient allocation of resources between private goods and public goods.

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