Efficient Compensation: Lessons from Civil Liability

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Abstract

This paper deals with compensation requirements ensuring efficient incentives in a setting with two active parties whose decisions affect a third party through an external effect. To achieve efficient incentives under civil liability, expectation damages may have to be based on a reasonable person standard and enrichments due to deviations from obligations must be returned. Adapting these lessons to the takings interpretation of the model would require unusual steps, unheard of in actual compensation practice. Yet, if taking decisions are reached in line with theories of public choice, an externality is implicitly present which, if neglected, tends to distort incentives.

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1 Introduction

In many countries, private property may be taken for public use but only with just compensation. In Germany, for instance, expropriation can be ordered by law but the level of compensation must also be governed by law.

The owner whose property is taken by the government perceives expropriation pretty much as harm done to her property by a private debtor. Under civil law, the owner would be entitled to expectation damages or, in German terminology, to damages in line with the difference hypothesis, which make the creditor equally well-off as if the debtor had met her obligation. On economic grounds, full compensation is usually justified as it may generate efficient incentives.

The efficiency claim is actually true if expectation damages are granted relative to efficient obligations. Yet, to avoid overreliance from damages relative to a non-contingent and, hence, inefficient obligation, the quantification of damages must be modified appropriately. In fact, expectation damages should be quantified on the basis of a reasonable person standard and enrichments due to deviations from obligations may have to be returned to ensure efficient incentives for the involved parties. These are the lessons from civil liability.

In striking difference to civil liability, taking law seems much softer on compensation requirements. Schäfer (2015) argues that, under the law of eminent domain, less than full compensation is the rule but for good reasons. The state cannot be incentivized by a damages award in the same way as a private actor because it will spread compensation requirements among millions of tax payers. Schäfer, however, does neither explore the effects of such a bias on investment and taking incentives nor what would be the socially desirable degree of undercompensation.

More than three decades earlier, Blume et al. (1984) had examined a model of a taking agency suffering from budgetary fiscal illusion, which they specified as a bias in the perception of costs. They showed that neither zero nor full compensation would generate efficient incentives, but they left it open, which transfer scheme would provide efficient incentives in the presence of budgetary fiscal illusion.

It seems puzzling that compensation under civil law provides efficient
incentives while, under taking law, it does not. To resolve the puzzle, the present paper takes a public choice perspective of takings and argues that the civil law analogy would involve two active parties whose decisions affect a third one through an external effect. This is not reflected by actual compensation practice under taking law.

To be sure, adapting the lessons from civil liability would require some rather unconventional steps, unlikely ever to be taken. Yet, neglecting the external effect, which is implicitly present if taking decisions obey rules of public choice, quite likely distorts investments of the property owner and/or the taking decision of the governmental agency in charge of it.

In addition to these findings, the paper also revisits part of the literature, much of which deals with benevolent taking decisions guided by social welfare and totally insensitive to compensation requirements. Blume et al. (1984) have proposed a general equilibrium setting where zero but not full compensation would be efficient if the taking agency is guided by benevolence in the above sense. In the game-theoretic setting of the present paper, zero compensation would, in general, not be efficient.

Miceli (1991) and Hermelin (1995) have also studied benevolent taking behavior but in a game-theoretic setting (which the present paper generalizes). Hermelin suggests to make the current owner residual claimant such that she would have efficient investment incentives for sure. This scheme would implicitly require the current owner to compensate the rest of society for not having invested efficiently while it totally neglects compensating the owner for the taking of her property.

For the same setting of binary taking choice, Miceli (1991) claims that full compensation based on efficient investments of the party whose property is taken (even if she actually has invested at a different level) also generates efficient investment incentives. The present paper questions Miceli’s claim. Hewer and Göller (2014), in fact, provide an explicit example for which the claim is wrong.

On behavioral grounds, I find taking decisions totally insensitive to compensation requirements rather implausible. While Blume et al. (1984) also mainly deal with takings guided by benevolence, they have one section on compensation when the project decisions are subject to fiscal illusion. Their setting of fiscal illusion will serve as an illustration of the more general ex-
ternality perspective propagated by the present paper.

Only in the absence of such an externality, bilateral transfer schemes of compensatory nature would exist, which provide efficient incentives for even two-sided investments as well as the taking decision. This has been shown by Göller and Hewer (2014) for a setting of binary taking decisions. It also follows from Schweizer (2016) who has dealt with the setting of the present paper but restricted to two parties.

The present paper is organized as follows. In section 2, the general model is introduced which captures, both, a contractual relationship and a setting of takings. Section 3 establishes a sequential version of the compensation principle, which specifies compensation requirements sufficient to ensure efficient incentives. Section 4 deals with obligation-based transfer schemes that satisfy the compensation requirements as needed for the compensation principle. Section 5 provides a public choice perspective of taking decisions. Budgetary fiscal illusion serves as an example. Section 6 investigates incentives from a bilateral compensation scheme. The corresponding compensation requirements are not sufficient to ensure efficient incentives. Section 7 revisits taking decisions guided by benevolence as studied by parts of the literature. Section 8 concludes. An appendix examines the role of returning enrichments in providing efficient incentives. Only if both parties face efficient obligations, keeping enrichments for free would not distort incentives.

2 The general model

In this section, a general model of sequential choice is introduced which will allow for interpretations in contract and tort law as well as in taking law. There exist three parties A, B and H and three consecutive stages. At the first stage, party A (she) decides on investments $x \in X$ under uncertainty. At stage 2, uncertainty resolves as nature randomly draws the state $\omega \in \Omega$ before, at stage 3, party B (he) reaches the ex-post decision $q \in Q$.

The utility $U_i(x, \omega, q)$ of party $i \in \{A, B, H\}$ depends on the decisions $x$ and $q$ taken by the two active parties A and B as well as the state $\omega$ of nature. Party H remains passive but suffers from harm $H(x, \omega, q) = -U_H(x, \omega, q)$.

A trilateral transfer scheme $T = (T_A, T_B, T_H)$ is a mapping from the Cartesian product $X \times \Omega \times Q$ into $\mathbb{R}^3$ where $T_i(x, \omega, q)$ denotes the payment
to party $i$. Only self-contained transfer schemes will be considered, that is,
\[ T_A(x, \omega, q) + T_B(x, \omega, q) + T_H(x, \omega, q) = 0 \]
is assumed to hold for all $x$, $\omega$ and $q$. Preferences of all three parties are assumed quasi-linear such that, for a given transfer scheme $T$, party $i$'s preference are represented by payoff functions $U_i(x, \omega, q) + T_i(x, \omega, q)$.

Due to quasi-linearity, welfare is equal to the sum
\[ W(x, \omega, q) = U_A(x, \omega, q) + U_B(x, \omega, q) - H(x, \omega, q) \]
of utilities. The first-best solution consists of an investment decision $x^*$ and a state-contingent ex-post decision $q^*(\omega)$ maximizing expected welfare, that is,
\[ (x^*, q^*(\omega)) \in \arg \max_{(x, q(\omega))} E[W(x, \omega, q(\omega))] \quad (1) \]
where expectations are taken with respect to the exogenously given distribution of the state $\omega$.

The transfer scheme $T$ is called \textit{compensatory relative to the efficient reference profile} $(x^*, q^*(\omega))$ if the compensation requirements
\[ \Pi_A(x^*, \omega, q) \geq \Pi_A(x^*, \omega, q^*(\omega)) \text{ and } \Pi_B(x, \omega, q^*(\omega)) \geq \Pi_B(x^*, \omega, q^*(\omega)) \quad (2) \]
are fulfilled for unilateral deviations $q$ and $x$ and
\[ \Pi_H(x, \omega, q) \geq \Pi_H(x^*, \omega, q^*(\omega)) \quad (3) \]
for any deviation from the efficient reference profile $(x^*, q^*(\omega))$. Condition (2) requires that no active party will be worse off under unilateral deviations from the efficient reference profile by the other active party whereas condition (3) requires that the passive party will be worse off under no deviation whatsoever from the reference profile by the two active parties.

Transfer schemes which are compensatory relative to an efficient reference profile provide efficient incentives for both active parties as will be shown in the next section.

3 The sequential compensation principle

Suppose we are given a trilateral transfer scheme $T = (T_A, T_B, T_H)$ leading to payoff functions $\Pi_i(x, \omega, q) = U_i(x, \omega, q) + T_i(x, \omega, q)$. To examine incentives,
I proceed by backward induction. At stage 3, party B reaches the ex-post decision
\[ q_B(x, \omega) \in \arg \max_{q \in Q} \Pi_B(x, \omega, q) \tag{4} \]
which maximizes his payoff (given the history \(x\) and \(\omega\)). This decision may fail being ex-post efficient, in which case there is scope for voluntary renegotiations.

Let \(\Pi'_i(x, \omega)\) denote post-renegotiation payoffs of party \(i\). Suppose the consent of all parties is needed such that each party, by refusing, could trigger the ex-post decision \(q_B(x, \omega)\). As a consequence, the participation constraints
\[ \Pi_i(x, \omega, q_B(x, \omega)) \leq \Pi'_i(x, \omega) \tag{5} \]
must hold for all \(i, x\) and \(\omega\).

Moreover, at stage 3, investments are sunk and, hence, the sum of post-renegotiation payoffs cannot exceed the ex-post efficient welfare, that is,
\[ \Pi'_A(x, \omega) + \Pi'_B(x, \omega) + \Pi'_H(x, \omega) \leq \max_{q \in Q} W(x, \omega, q) \tag{6} \]
must hold for all \(x\) and \(\omega\). Notice, if renegotiations are ex-post efficient (as usually assumed in the theory of incomplete contracts) then (6) would be binding whereas, in the absence of renegotiations, the participation constraints (5) would be binding. The sequential compensation principle will cover both cases.

Anticipating all this, party A has the incentive to take the investment decision
\[ x_A \in \arg \max_{x \in X} E[\Pi'_A(x, \omega)] \tag{7} \]
which maximizes her expected payoff at stage 1. If the transfer scheme is compensatory relative to the efficient reference profile \((x^*, q^*(\omega))\) then it must be efficient if the sense of the following proposition, referred to as sequential compensation principle.

**Proposition 1** If the trilateral transfer scheme \(T\) is compensatory relative to the efficient reference profile \((x^*, q^*(\omega))\), then it is optimal for A to invest efficiently, that is, \(x^*\) solves (7) whether inefficient subgame perfect continuations are renegotiated or not. Moreover, for any solution \(x_A^*\) of (7), expected payoffs amount to \(E[\Pi'_i(x_A^*, \omega)] = E[\Pi_i(x^*, \omega, q^*(\omega))]\) for all parties \(i \in \{A, B, H\}\).
**Proof.** It follows from (2) and the participation constraints (5) that
\[
\Pi_A(x^*, \omega, q^*(\omega)) \leq \Pi_A(x^*, \omega, q_B(x^*, \omega)) \leq \Pi'_A(x^*, \omega)
\]
and from (3) and (5) that
\[
\Pi_H(x^*, \omega, q^*(\omega)) \leq \Pi_H(x, \omega, q_B(x, \omega)) \leq \Pi'_H(x, \omega)
\]
as well as from (2), (4) and (5) that
\[
\Pi_B(x^*, \omega, q^*(\omega)) \leq \Pi_B(x, \omega, q_B(x, \omega)) \leq \Pi'_B(x, \omega)
\]
must hold and, hence, from (6), (1) and the above inequalities, that the chain of inequalities
\[
E[\Pi'_A(x, \omega)] \leq E\left[\max_q W(x, \omega, q) - \Pi'_B(x, \omega) - \Pi'_H(x, \omega)\right] \leq
\]
\[
E\left[W(x^*, \omega, q^*(\omega)) - \Pi_B(x^*, \omega, q^*(\omega)) - \Pi_H(x^*, \omega, q^*(\omega))\right] =
\]
\[
E[\Pi_A(x^*, \omega, q^*(\omega))] \leq E[\Pi'_A(x^*, \omega)]
\]
is satisfied. Therefore, efficient investments \(x^*\) maximize party A’s objective function and the first claim is established.

For any other maximizer \(x^*_A\), all constraints of the above chain evaluated at \(x = x^*_A\) must be binding and, hence, \(E[\Pi'_i(x^*_A, \omega)] = E[\Pi_i(x^*, \omega, q^*(\omega))]\) must be binding as well (for \(i = B, H\)). This establishes the second claim. ■

Transfer schemes, which are compensatory relative to the efficient reference profile, provide efficient incentives for both active parties. The next section applies the sequential compensation principle to the civil law interpretation of the general model.

### 4 Obligation-based transfer schemes

In civil law, transfer schemes result from the damages regime in place. Think of a contractual relationship where parties specify obligations themselves and suppose that party A has accepted the obligation to invest in reliances at the efficient level \(x^*\). To economize on transaction costs, however, parties have specified in their contract a simple, non-contingent performance obligation \(q^o \in Q\) for party B which, ex post, may turn out to be inefficient (for some contingencies at least). Recall, it is exactly such a non-contingent
performance obligation which leads to the overreliance result established by Shavell (1980). Expectation damages will be quantified relative to the non-contingent (hence partly inefficient) obligation profile \((x^*, q^o)\).

At actual decisions \((x, q)\), expectation damages (in Germany, damages in line with the difference hypothesis) owed by A to \(j = B, H\) are derived from the differences

\[
D_{Aj}(x, \omega, q) = U_j(x^*, \omega, q) - U_j(x, \omega, q)
\]

whereas damages owed by B to \(i = A, H\) are derived from

\[
D_{Bi}(x, \omega, q) = U_i(x, \omega, q^o) - U_i(x, \omega, q).
\]

Notice, if the difference \(D_{AB}(x, \omega, q)\) is positive, then it corresponds to expectation damages owed by A to B for the deviation \(x \neq x^*\) from her obligation to invest efficiently. If \(D_{AB}(x, \omega, q)\) is negative, then B enjoys an enrichment of size \(-D_{AB}(x, \omega, q)\) due to A’s deviation. The other differences are interpreted analogously.

Under the obligation-based transfer scheme \(T^o\), by definition, the payoff functions amount to

\[
\Pi_A^o(x, \omega, q) = U_A(x, \omega, q) + D_{BA}(x^*, \omega, q) - D_{AB}(x, \omega, q) - D_{AH}(x, \omega, q) = W(x, \omega, q) - W(x^*, \omega, q) + U_A(x^*, \omega, q^o),
\]

\[
\Pi_B^o(x, \omega, q) = U_B(x, \omega, q) + D_{AB}(x, \omega, q) - D_{BA}(x^*, \omega, q) - D_{BH}(x^*, \omega, q) = W(x^*, \omega, q) - W(x^*, \omega, q^o) + U_B(x^*, \omega, q^o)
\]

and

\[
\Pi_H^o(x, \omega, q) = D_{AH}(x, \omega, q) + D_{BH}(x^*, \omega, q) - H(x, \omega, q) = -H(x^*, \omega, q^o)
\]

for party A, B and H, respectively. Notice, damages owed by B (the party facing an inefficient obligation) are based on efficient investments \(x^*\) of A (the party facing obligation \(x^*\)) even if A has deviated from it. On legal grounds, such a quantification may be justified as a reasonable person standard because a prudent copy of party A would have met her obligation to invest efficiently.1

1If damages were based on actual investments instead then, in general, incentives may fail to be efficient for the same reason as overreliance occurs in the setting studied by Shavell (1980).
The virtue of the obligation-based transfer scheme stems from being compensatory relative to the efficient reference profile \((x^*, q^*(\omega))\). In fact, under the obligation-based transfer scheme, compensation requirements (2) and (3) even hold as equalities such that, a fortiori, the compensation principle applies.

To conclude this section, let me discuss the case of purely selfish investments. By definition, such investments do not affect the benefit to the rest of society, that is,

\[
U_B(x, \omega, q) - H(x, \omega, q) = U_B(x^*, \omega, q) - H(x^*, \omega, q)
\]

holds for all \(x, \omega\) and \(q\). Under purely selfish investments, party A never owes damages to the other two parties as

\[
D_{AB}(x, \omega, q) + D_{AH}(x, \omega, q) = 0
\]

holds for all \(x, \omega\) and \(q\). In this case, the difference \(-D_{AH}(x, \omega, q)\) owed by \(H\) to \(A\) coincides with the difference \(D_{AB}(x, \omega, q)\) owed by \(A\) to \(B\). Instead, the difference \(D_{AB}(x, \omega, q)\) can be directly deduced from \(H\)'s claims against \(B\) such that the net claim of \(H\) against \(B\) amounts to

\[
N_{BH}(x, \omega, q) = H(x^*, \omega, q^c) - H(x^*, \omega, q) - D_{AB}(x, \omega, q).
\]

The net payment to \(A\) amounts to \(T_A(x, \omega, q) = D_{BA}(x^*, \omega, q)\) and the net payment to \(B\) to \(T_B(x, \omega, q) = -D_{BA}(x^*, \omega, q) - N_{BH}(x, \omega, q)\).

Obligation-based transfer schemes are efficient even if party \(B\) faces an inefficient obligation. These are the lessons from civil liability which, in the next sections, will be adapted to the taking interpretation of the general model.

5 Public choice

In the taking interpretation of the general model, party \(A\) is the current owner deciding on investments \(x \in X\) to raise the value of her property. Party \(B\) is an agency in charge of reaching the taking decision \(q \in Q\) ex post, that is, after uncertainty has resolved and the true state \(\omega \in \Omega\) of nature has become known. This agency is acting on behalf of society. The choice
$q^o \in Q$ refers to the (non-contingent) alternative of not taking A’s property even in those states where the taking would be efficient.

Party A’s behavior is still guided by quasi-linear preferences with underlying utility function $U_A(x, \omega, q)$. The behavior of party B as a governmental agency, however, may be different. Some of the literature has considered benevolent taking behavior under which B maximizes welfare while remaining completely insensitive to compensation requirements. Benevolent takings will be revisited in section 7 below.

The present section, in contrast, deals with a public choice perspective where decision-making may result in outcomes that are in conflict with the preferences of the general public. In contrast to benevolent taking behavior, I assume agency B being guided by quasi-linear preferences with underlying utility function $U_B(x, \omega, q)$. As B’s preferences are quasi-linear, the agency will remain sensitive to compensation requirements. Rather, the conflict with welfare $W(x, \omega, q)$, representing preferences of society, is interpreted as external effect in the sense that utility $U_A$ and $U_B$ of A and B do not add up to welfare $W$. The difference

$$H(x, \omega, q) = U_A(x, \omega, q) + U_B(x, \omega, q) - W(x, \omega, q)$$

can be visualized as harm, which a (virtual) third party H suffers from.

For simplicity, party A’s investments are assumed to be purely selfish such that the benefit

$$U_{nA}(x, \omega, q) = U_B(x, \omega, q) - H(x, \omega, q) = W(x, \omega, q) - U_A(x, \omega, q)$$

to the rest of society remains independent of A’s investments, that is, for all $x, \omega$ and $q$, $U_{nA}(x, \omega, q) = U_{nA}(x^*, \omega, q)$ must hold.

In principle, the lessons from civil liability could be adapted to the taking interpretation of the general model as follows. Without taking, of course, no compensation payments should be due. For the obligation-based transfer scheme to have this property, party B is assumed to face the non-contingent, possibly inefficient obligation $q^o$ not to take the property.

If B deviates with $q \neq q^o$, then B must pay compensation $U_A(x^*, \omega, q^o) - U_A(x^*, \omega, q)$ to A based, though, on efficient investments $x^*$ even if A has actually invested $x \neq x^*$ (reasonable person standard). On top of it, B would have to pay net compensation $N_{BH}(x^*, \omega, q)$ to H as specified at the end of
the previous section (see (9)). In compensation practice, such a construction is of course unheard of.

Blume et al. (1984) have a section on budgetary fiscal illusion. For illustration, I interpret taking behavior under fiscal illusion in the above sense of public choice.

Party A as the current owner of the property chooses the level \( x \in X \subset \mathbb{R}_+ \) of investments to raise the value of her property (if not taken). Party B reaches a binary taking decision \( q \in \{0, 1\} \). Party A’s utility function is

\[
U_A(x, \omega, q) = v_A(x, \omega) \cdot (1 - q) - x
\]

where \( v_A(x, \omega) = U_A(x, \omega, 0) - U_A(x, \omega, 1) \) denotes A’s loss from a taking. The benefit \( v_{nA}(\omega) \) to the rest of society (all members but A) from the taking is assumed independent of A’s investments (selfish investments) such that welfare amounts to

\[
W(x, \omega, q) = v_A(x, \omega) \cdot (1 - q) + v_{nA}(\omega) \cdot q - x
\]

as a function of history \((x, \omega, q)\).

The taking decision under budgetary fiscal illusion of degree \( \theta \in [0, 1) \) is guided by the following criterion. Suppose the rest of society must pay \( c \) to A if B takes her property, in which case party A suffers from a net loss of \( v(x, \omega) - c \). Due to fiscal illusion, agency B merely takes the discounted value \( \theta \cdot [v_A(x, \omega) - c] \) of A’s loss into account. The agency then compares the discounted net loss to A with the undiscounted net benefit \( v_{nA}(\omega) - c \) to the rest of society. Party B takes the property if and only if the undiscounted net benefit exceeds the discounted net loss, that is, if the condition \( v_{nA}(\omega) - c \geq \theta \cdot [v_A(x, \omega) - c] \) or, equivalently,

\[
v_B(x, \omega) = \frac{v_{nA}(\omega) - \theta \cdot v_A(x, \omega)}{1 - \theta} \geq c
\]

is met. Therefore, the same criterion can be expressed by making use of the (as-if) utility function \( U_B(x, \omega, q) = v_B(x, \omega) \cdot q \). In fact, B takes the property if and only if \( U_B(x, \omega, 1) - c \geq U_B(x, \omega, 0) \) holds.

Blume et al. have not dealt explicitly with trilateral transfer schemes. Yet, there is an easy extension. In fact, if the preferences of agency B have to remain quasi-linear (otherwise the lessons from civil liability would not apply) then, under any trilateral transfer scheme \( T \), party B would take the
property if and only if $U_B(x, \omega, 1) + T_B(x, \omega, 1) \geq U_B(x, \omega, 0) + T_B(x, \omega, 0)$ holds. In other words, the (as-if) utility of B is specified such that payments to or from B need no longer be discounted.

The value $v_B(x, \omega)$ of a taking as perceived by B differs from the benefit $v_{nA}(\omega)$ to the rest of society by

$$h(x, \omega) = v_B(x, \omega) - v_{nA}(\omega) = \frac{\theta}{1 - \theta} \cdot [v_{nA}(\omega) - v_A(x, \omega)],$$

leading to a harm function $H(x, \omega, q) = h(x, \omega, q) \cdot q$ well in line with the externality perspective of public choice. The net claim $N_{BH}$ of H against B as specified by (9) amounts to

$$N_{BH}(x, \omega, q) = \frac{\theta}{1 - \theta} \cdot [v_{nA}(\omega) - v_A(x, \omega)] \cdot q$$

whereas A is entitled to receive

$$D_{BA}(\omega, q) = v_A(x^*, \omega) \cdot [(1 - q^o) - (1 - q)] = v_A(x^*, \omega) \cdot q$$

from B.

Under this trilateral transfer scheme, no payments are due in the absence of a taking. If, however, B takes the property it must pay $v_A(x^*, \omega)$ as compensation to A, based on efficient investments even if A has deviated, and B must pay the net sum $N_{BA}(x, \omega, 1)$ to H. Notice, this sum is positive if taking the property were ex post efficient whereas, if taking the property were inefficient, then the taking agency B should be granted a budget increase for not taking the property.

The efficient compensation regime adopted from civil liability would be of trilateral nature. To institutionalize this arrangement, the taking agency would have, not only, to compensate the property owner but, for incentive reasons, would also have to pay $N_{BH}$ to another agency (receive from if negative) which is not actively involved in the taking decision.

Under actual taking law, however, compensation practice remains of bilateral nature, not involving payments to or from a third party. In general, it is rather unlikely that bilateral compensation schemes generate efficient incentives for, both, the investment and the taking decision if the taking agency operates according to public choice of the above type. This view is reinforced by the analysis of the next section.
6 Bilateral compensation schemes

No doubt, as long as the lesson from civil liability suggests to institutionalize a virtual party whenever compensation for takings is at stake, legal practice will hardly comply with such advice. For that reason, weakening the compensation requirement seems highly desirable if it would lead to a compensation scheme of bilateral nature while still providing efficient incentives for both parties.

By awarding damages \( D_{BH}(x^*, \omega, q) \) to A and \( D_{AH}(x, \omega, q) \) to B (instead of to H as under the trilateral obligation-based scheme), a bilateral transfer scheme would emerge quite naturally, leading to payoff functions

\[
\Pi_A^b(x, \omega, q) = \Pi_A^o(x, \omega, q) + D_{BH}(x^*, \omega, q)
\]

and

\[
\Pi_B^b(x, \omega, q) = \Pi_B^o(x, \omega, q) + D_{AH}(x, \omega, q)
\]

for A and B whereas H’s payoff amounts to \( \Pi_H^b(x, \omega, q) = -H(x, \omega, q) \) as H receives no payments anymore under the bilateral scheme.

This bilateral transfer scheme is easily seen to exhibit the following properties in terms of compensation. If party A unilaterally deviates from efficient investments \( x \neq x^* \) while B still takes the ex-post decision \( q^*(\omega) \) that would be efficient if A had invested efficiently, then the rest of society (coalition of B and H) cannot be worse off than under the efficient reference profile \( (x^*, q^*(\omega)) \). Similarly, if party A has invested efficiently but B deviates unilaterally from the efficient ex-post decision by choosing \( q \neq q^*(\omega) \), then the rest of society (coalition of A and H) can also not be worse off than under the efficient reference profile.

Compensation requirements in terms of coalitions as above turn out to be sufficient for the efficient reference profile \( (x^*, q^*(\omega)) \) to form a Nash equilibrium of the associated normal form game, where strategies are complete contingent plans. This normal form game captures the same strategic interaction as under sequential choice. The proof of this version of the compensation principle, in fact, could easily be adapted from the proof of proposition 1 above.

Yet, to ensure payoff equivalence of all Nash equilibria in the normal form of the game, coalitional compensation requirements are no longer sufficient.
as the following example demonstrates. For simplicity, sequential choice is considered in the absence of uncertainty (no move of nature). The example is constructed such that the subgame perfect equilibrium is inefficient in spite of the fact that the bilateral transfer scheme fulfills the compensation requirements in terms of coalitions as spelled out above.

In the example, parties A and B both take a binary decision \( x \in X = \{x^o, x^s\} \) and \( q \in Q = \{q^o, q^s\} \). Parameter values are specified such that

\[
\max [W(x^o, q^o), W(x^o, q^s), W(x^s, q^o)] < W(x^s, q^s)
\]

and, hence, the non-contingent pair \((x^s, q^s)\) can serve as the efficient reference profile. Moreover, the difference \( H(x^s, q^o) - H(x^s, q^o) \) is chosen such that

\[
W(x^s, q^o) - W(x^s, q^o) < H(x^s, q^o) - H(x^s, q^o)
\]

whereas the difference \( H(x^o, q^o) - H(x^o, q^o) \) is chosen such that

\[
W(x^s, q^s) - W(x^s, q^s) + H(x^s, q^o) - H(x^s, q^o) < H(x^o, q^o) - H(x^o, q^o)
\]

both hold.

Given such a parameter constellation, party B’s payoff under the bilateral transfer scheme amounts to \( \Pi_B^B(x, q) = \Pi_B^B(x, q) + D_{AH}(x, q) \) and, hence (as follows from (8)), to

\[
\Pi_B^B(x, q) = U_B(x^s, q^o) + W(x^s, q) - W(x^s, q^o) + H(x, q) - H(x^s, q)
\]

whereas A’s payoff amounts to \( \Pi_A^B(x, q) = W(x, q) - \Pi_B^B(x, q) + H(x, q) \) and, hence, to

\[
\Pi_A^B(x, q) = W(x, q) - U_B(x^s, q^o) - W(x^s, q) + W(x^s, q^o) + H(x^s, q).
\]

The efficient reference profile \((x^s, q^s)\) remains to be a Nash equilibrium of the normal form game as follows from the compensation principle. In particular, \( y_B(x^s) = q^s \) is the subgame perfect continuation as chosen by party B in response to party A’s efficient decision \( x^s \).

Moreover, it follows from (11), that \( \Pi_B^B(x^o, q^o) > \Pi_B^B(x^o, q^s) \) and, hence, \( q_B(x^o) = q^o \) is the best response to \( x^o \) by B. Finally, since A anticipates the subgame perfect response of B and since \( \Pi_A^B(x^o, q^o) > \Pi_A^B(x^s, q^s) \) as follows from (10), party A invests \( x_A = x^o \neq x^s \) in subgame perfect equilibrium and,
hence, the subgame perfect equilibrium fails to be efficient (even though the efficient profile is a Nash equilibrium in the normal form game).

To sum up, while the bilateral version of the obligation-based transfer scheme would be attractive as it does not involve a (virtual) third party, the subgame perfect equilibrium outcome need no longer be efficient.

7 Taking decisions guided by benevolence

Some literature on takings has considered benevolent taking behavior in the sense of party B taking the property (independent of compensation requirements) if and only if it is ex post efficient to do so. The compensation principle can easily be adapted to examine taking behavior of this kind.

Benevolent taking decisions \( q^w(x, \omega) \in \arg \max_{q \in Q} W(x, \omega, q) \) maximize welfare as a function of actual investments \( x \) and state \( \omega \), independent of the transfer scheme in place. Anticipating the ex post efficient taking decision, expected welfare and party A’s expected utility are functions of investments \( x \) only, amounting to \( w(x) = E[W(x, \omega, q^w(x, \omega))] \) and \( u_A(x) = E[U_A(x, \omega, q^w(x, \omega))] \).

As the ex-post decision remains efficient independent of compensation requirements, generating efficient investment incentives for the current owner A of the property is the only goal left from the efficiency perspective. To achieve this goal based on the compensation principle, A must compensate the rest of society for deviations from her obligation to invest efficiently, no matter, whether her property is taken or not.

Let \( t_A(x) \) denote the net payment which party A expects to receive if she has invested \( x \). As the scheme is self-contained and of bilateral nature, the expected net payment to B amounts to \( t_B(x) = -t_A(x) \). Party A’s expected payoff amounts to \( \pi_A(x) = u_A(x) + t_A(x) \). Let \( \pi_{nA}(x) = w(x) - \pi_A(x) = w(x) - u_A(x) - t_A(x) \) denote the payoff as expected by the rest of society (all but A). The bilateral transfer scheme \( t \) is called unilaterally compensatory relative to efficient investments if

\[
\pi_{nA}(x) \geq \pi_{nA}(x^*)
\]

holds for any deviation \( x \neq x^* \) from efficient investments.
Whenever the compensation requirement (12) is satisfied then, as follows from the compensation principle, efficient investments $x^*$ maximize the private benefit $\pi_A(x)$ of party A and any other such maximizer (if more than one exists) must also maximize welfare. In other words, if the bilateral transfer scheme is unilaterally compensatory relative to efficient investments then

$$x^* \in \arg \max_{x \in X} \pi_A(x) \subset \arg \max_{x \in X} w(x)$$

must hold. This is the unilateral version of the compensation principle.

Let me confront these findings with some literature on takings. Hermanlin (1995) has considered transfer schemes where party A receives, up to a constant residual $r$, all of welfare such that A’s payoff amounts to

$$\pi_A(x) = u_A(x) + t_A(x) = w(x) - r.$$ 

Obviously, this scheme generates efficient incentives and it also is unilaterally compensatory relative to efficient investments. Yet, the driving force is not compensating the current owner for taking her property and, on this account, it hardly reflects fair compensation as requested by laws of eminent domain.

Except for the section on budgetary fiscal illusion, Blume et al. (1984) have also mainly dealt with benevolent taking behavior in the above sense. In a general equilibrium setting, they have shown that zero compensation would generate efficient investment incentives for party A. In my game-theoretic setting, however, zero compensation would be unilaterally compensatory if and only if

$$\pi_{nA}(x) = w(x) - u_A(x) \geq w(x^*) - u_A(x^*) = \pi_{nA}(x^*)$$

holds for all $x$. For binary taking decisions $q \in Q = \{0, 1\}$ as considered in section 5, the benefit to the rest of society amounts to

$$\pi_{nA}(x) = w(x) - u_A(x) = E [v_{nA}(\omega) \cdot q^w(x, \omega)]$$

where $q^w(x, \omega) = 1$ if and only if $v_{nA}(\omega) \geq v_A(x, \omega)$. It is easy to construct parameter configurations where this term does not attain a minimum at efficient investments $x^*$. Under such configurations, zero compensation cannot be unilaterally compensatory. In principle, efficient incentives may still prevail as the compensation requirement is a sufficient condition only
for efficiency. Yet, in my game-theoretic setting, examples may easily be constructed where zero compensation fails to generate efficient incentives.

Blume et al. have also considered full compensation but dismissed it as being inefficient. In my game-theoretic setting, full compensation means expected transfer payments $t_A(x) = E[U_A(x, \omega, q^0)] - u_A(x)$ to A. This scheme would be unilaterally compensatory if and only if

$$\pi_{nA}(x) = w(x) - E[U_A(x, \omega, q^0)] \geq w(x^*) - E[U_A(x^*, \omega, q^0)] = \pi_{nA}(x^*)$$

holds for all $x$. For binary taking decisions as introduced in section 5, the benefit to the rest of society amounts to

$$\pi_{nA}(x) = w(x) - E[U_A(x, \omega, q^0)] = E[(v_{nA}(\omega) - v_A(x, \omega)) \cdot q^w(x, \omega)].$$

It is again easy to construct parameter configurations where $\pi_{nA}(x)$ does not attain a minimum at $x^*$ and, hence, where the compensation requirement (12) is violated. Therefore, in my game-theoretic setting too, full compensation should not be expected to generate generally efficient investment incentives.

Miceli (1991), finally, has proposed to grant full compensation but based on efficient investments even if party A has deviated. Under his scheme, the payment expected by A amounts to

$$t_A(x) = E[U_A(x^*, \omega, q^0)] - U_A(x^*, \omega, q^w(x, \omega))$$

after having invested $x$. Göller and Hewer (2014) have specified a counterexample where Miceli’s rule fails providing efficient incentives. In their example, Miceli’s transfer scheme must, a fortiori, fail being unilaterally compensatory because compensation requirement (12) is a sufficient condition for efficient incentives.

To exclude inefficient incentives under zero and full compensation from benevolent takings, restrictive assumptions on the shape of objective functions would be needed. The compensation requirement (12), in contrast, is more robust as it ensures efficient incentives without restrictive assumptions.

8 Concluding remarks

This paper deals with compensation requirements as sufficient conditions for efficient incentives. If compensation requirements are violated, under the appropriate but possibly restrictive assumptions, efficient incentives may still
prevail. In fact, the informational setting implicitly underlying the compensation principle would allow for many transfer schemes (including bilateral ones not in need of a virtual party), which provide efficient incentives but without aiming at compensating parties. In this sense, compensation requirements cannot be a necessary ingredient for generating efficient incentives.

Rather, compensation is a legal desideratum under civil law and, to some degree at least, also under the law of eminent domain. The present paper restricts transfer schemes to those, which reflect the legal principle of compensation in a way that ensures efficient incentives.

In legal practice, compensation for takings gives rise to a bilateral transfer scheme involving payments from the taking agency to the owner if her property is taken. If the utility function of the agency coincides with the utility to the rest of society (all but the owner) and if the agency takes compensation requirements unbiasedly into account, then obligation-based and bilateral transfer schemes exist, generating efficient incentives for all active parties, independent of equilibrium selection.

If the agency always takes the ex post efficient taking decision, totally insensitive to compensation requirements, bilateral transfer schemes would also exist, which provide efficient investment incentives, independent of equilibrium selection. In fact, by making the current owner residual claimant, she would face efficient investment incentives. This scheme holds her liable for inefficient investments, no matter, whether her property is taken or not. Yet, it hardly reflects fair compensation of the owner as required by taking law.

Anyhow, on behavioral grounds, taking decisions totally insensitive to compensation requirements as well as taking decisions sensitive to compensation requirements in a fully unbiased way seem rather implausible. More likely, taking agencies are sensitive to such requirements but with a biased perception of costs. As a consequence, the utility function of the current owner and the assessment function of the agency do not add up to welfare. The difference has been interpreted as external effect imposed on a third party.

Under the civil law interpretation of the model, this third party would be real and the civil law solution would consist of a damages regime involving all three parties. As its main contribution, the present paper designs dam-
ages regimes in line with principles from civil liability, leading to efficient compensation.

Taking decisions sensitive to compensation requirements but with a biased perception of costs can be captured by an isomorphic model and, on purely logical grounds, it would be possible to adapt the efficient solution from civil liability. But this would require to think of a third party which, for incentive reasons, absorbs any difference of transfer payments between mutual claims of the owner and the agency against each other. The agency taking the property may have to transfer money, not only, to the current owner of the property but also to an account of some other agency which is not actively involved in the taking decision. This gives rise to a trilateral compensation scheme.

By relying on transfer schemes of bilateral nature instead, legal practice of compensation for takings neglects the external effect and, is unlikely to generate efficient incentives whenever taking behavior is of public choice nature. This insight is a second contribution of the present paper.

9 Appendix: not returning enrichments

By definition, the obligation-based, trilateral transfer scheme requires that enrichments due to deviations from obligations must be returned. Yet, under contract law and, in particular, under tort law, benefits due to deviations from obligations may sometimes be kept for free. If, e.g., a debtor invests into precaution beyond duty the creditor would enjoy a higher expected safety without owing any compensation for it to the debtor.

In this appendix, it is shown that not returning enrichments would not distort incentives provided that both parties face efficient obligations (as usually assumed in tort cases where obligations are specified by courts). If, however, one of the active parties faces a non-contingent and, hence, possibly inefficient obligation, enrichments must be returned to ensure that the transfer scheme remains compensatory relative to the efficient reference profile and to still provide efficient incentives for both active parties.

To prove the first claim, suppose the efficient reference profile \((x^*, q^*(\omega))\) coincides with the obligation profile. If enrichments are kept for free then party \(i\) owes modified damages
\[D_{ij}^m(x, \omega, q) = \max\{D_{ij}(x, \omega, q), 0\}\] to party \(j\).
In fact, if $j$ benefits from a deviation of $i$, that is, $D_{ij}(x, \omega, q) < 0$, then $i$’s claim against $j$ vanishes as $D_{ij}^m(x, \omega, q) = 0$.

Damages modified this way give rise to a trilateral transfer scheme with net payments
\[
T_A^m(x, \omega, q) = D_{BA}^m(x^*, \omega, q) - D_{AB}^m(x, \omega, q) - D_{AH}^m(x, \omega, q)
\]
to party A and net payments
\[
T_B^m(x, \omega, q) = D_{AB}^m(x, \omega, q) - D_{BA}^m(x^*, \omega, q) - D_{BH}^m(x^*, \omega, q)
\]
to party B (notice, B’s claims are still based on a reasonable person standard). To be self-contained, party H must receive
\[
T_H^m(x, \omega, q) = T_A^m(x, \omega, q) + T_B^m(x, \omega, q).
\]

It is easy to show that the modified transfer scheme $T^m$ remains compensatory relative to the efficient reference profile $(x^*, q^*(\omega))$. Therefore, the sequential compensation principle still applies and, hence, the equilibrium outcome will be efficient even if enrichments are kept for free.

If, however, party $B$ is facing a non-contingent (hence possibly inefficient) obligation $q_o$ then returning enrichments from deviations may be needed to provide incentives for efficient breach. This claim is true for modifications at least, where no party meeting her or his obligation owes any damages, that is,
\[
D_{Aj}^m(x^*, \omega, q) = D_{Aj}(x^*, \omega, q) = 0 \text{ and } D_{Bi}^m(x, \omega, q_o) = D_{Bi}(x, \omega, q_o) = 0
\]
is assumed to hold for all $x, \omega$ and $q$ and for $j = B, H$ and $i = A, H$. Moreover, to avoid distortions for sure, I require the modified transfer scheme to remain compensatory relative to the efficient reference profile. In particular, the compensation requirement (3) at the unilateral deviation $(x^*, q^o)$ from the efficient reference profile $(x^*, q^*(\omega))$
\[
D_{AH}^m(x^*, \omega, q^o) + D_{BH}^m(x^*, \omega, q) - H(x^*, \omega, q) \geq
\]
\[
D_{AH}^m(x^*, \omega, q^*(\omega)) + D_{BH}^m(x^*, \omega, q^*(\omega)) - H(x^*, \omega, q^*(\omega))
\]
must be met. As the obligation-based transfer scheme satisfies the analogous compensation requirement
\[
D_{AH}(x^*, \omega, q^o) + D_{BH}(x^*, \omega, q) - H(x^*, \omega, q) =
\]
\[
D_{AH}(x^*, \omega, q^*(\omega)) + D_{BH}(x^*, \omega, q^*(\omega)) - H(x^*, \omega, q^*(\omega))
\]
with equality, it follows that
\[
D_{BH}^{m}(x^*, \omega, q^*(\omega)) \leq H(x^*, \omega, q^*(\omega)) - H(x^*, \omega, y^o) = D_{BH}(x^*, \omega, q^*(\omega))
\]
will hold. In other words, if party H must return an enrichment before the modification (because \(D_{BH}(x^*, \omega, q^*(\omega)) < 0\)) then, a fortiori, it must do so after the modification to ensure that the modified transfer scheme remains compensatory relative to the efficient reference profile.

10 References


