Balancing Grower Protection Against Agency Concerns: An Economic Analysis of Contract Termination Damages

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by

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Many policy makers and farm advocates have become increasingly concerned that contracts used in agricultural production or procurement may be unfairly biased in favor of large food processors at the expense of growers. In response, lawmakers in various states have proposed legislation designed to regulate the contracting process. For example, the Producer Protection Act of 2000 contains a list of regulations designed to protect growers and to provide them with bargaining power in the event that they are treated unfairly by large food processors. Among these regulations are rules that protect growers from undue termination or non-renewal of contracts by providing growers with the right to be “…reimbursed for damages incurred due to the termination, cancellation, or failure to renew. Damages shall be based on the value of the remaining useful life of the structures, machinery or equipment involved.”

One rationale for this regulation is that processors often offer short term contracts to farmers while requiring farmers to make substantial investments in new production facilities in order to secure a contract. These investments can take years to payoff while farmers are often given only short term contracts with no written guarantee of renewal. While non-renewal of short term contracts does not necessarily constitute a breach of contract, it nevertheless can leave growers with huge debts. For example, a recent Associated Press news article reported that some hog farmers in Arkansas, who did not have their contracts renewed, have appealed to the courts on the basis that there is a “breach of faith”. That is, even though there is no breach of contract, verbal commitments were made which induced growers to invest substantial capital into new equipment and housing facilities. While many states have proposed or passed legislation

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2 The link: [http://www.state.ia.us/government/ag/agcontractingexplanation.htm](http://www.state.ia.us/government/ag/agcontractingexplanation.htm) provides a description of the producer protection act in its entirety.
which restricts termination, or non-renewal of contracts, relatively few economic studies of these regulations have been undertaken.

In this paper, we provide an economic analysis of breach damages in a dynamic agency model where there is asset specificity and the potential for contract termination between periods. Specifically, we examine the impact of government mandated damages that compensate growers for contract-specific investments when growers are terminated without cause. Our paper makes a contribution to the small but growing literature on contract regulation, which is becoming an important issue at both the state and national levels, as contracting becomes more important and various policy makers and farm advocacy groups have become more vocal about alleged abuse of growers by large processors and integrators. While many agricultural economists have examined regulations related to tournament contracts (Leegomanchai and Vukina; Levy and Vukina; Tsoulouhas and Vukina; Roe and Wu; Wu and Roe) and limits to termination of growers in contracting relationships (Lewin), we are unaware of any economic analyses of breach damages that compensate growers who are unduly terminated.

Our two period principal agent model allows us to clarify the relationship between termination, asset specificity and moral hazard efficiency and how government regulation may impact the ability of processors to discipline agency problems. We show that asset specificity combined with the ability to terminate growers between contracting periods can serve as effective instruments for disciplining moral hazard thereby enhancing efficiency. On the other hand, the use of such instruments often creates other distortionary effects, and can leave growers vulnerable. We show, however, that breach damages designed with the intention of protecting growers may not necessarily improve
grower welfare and can lead to additional distortions that can reduce social welfare by reducing the ability of contractors to manage moral hazard. This can reduce the effectiveness of contracts in facilitating production efficiency and lead to a decrease in the development of value added products. We conclude our article by discussing possible alternatives to breach damages that might enhance grower welfare.

**Preliminaries**

Our economic analysis is based on a two period principal agent model between a risk neutral contractor (e.g. processor) and a risk neutral agent who faces a limited liability constraint which limits the extent to which the processor can “punish” the agent for poor performance via low or negative payments. Limited liability models are easier to solve and generalize than models of moral hazard with risk aversion and at the same time, do not trivialize the moral hazard problem as would be the case with risk neutrality and unlimited liability.\(^3\) Like the risk aversion model of moral hazard, the limited liability model imposes a tradeoff; namely, the tradeoff between incentive provision and limited liability rents. This is analogous to the tradeoff between risk premiums and incentives facing the contract designer in the risk aversion model of moral hazard and qualitative predictions are similar. Finally, limited liability models are appealing in that many real world contracts do not include explicit payment terms that allow for unlimited punishment via negative or even positive, but low payments.

We assume that the principal is interested in producing one unit of a downstream product to be sold to consumers. The principal can either produce a generic good or a differentiated, value added good. Denote the revenue functions for the differentiated and

\(^3\) It is well known that without limited liability, a simple solution to the moral hazard problem is to just make the agent the residual claimant and first best can be achieved.
the generic good by $R$ and $r$, respectively where $R \geq r$. Also assume that whether $R$ is strictly greater than $r$ or not depends on the quality of the input being used. That is, assume that in order to produce the differentiated product, the principal must use a high quality input. Assume that one unit of the downstream product requires one unit of an input good, which can take on two quality values denoted by $y_H$ and $y_L$, where $y_H > y_L$.

Then we have the following key assumptions: $R(y_H) > r(y_L)$ and $R(y_L) = r(y_H) = r(y_L)$.

Because the revenue function for the generic good does not vary with input quality, we will just denote it by $r$. Also, note that producing the differentiated product requires that the principal source a high quality input. Therefore, a key reason why the principal wants to contract is to be able to coordinate the production process so that it can provide adequate incentives in the event that it chooses to produce the differentiated good.

We also highlight additional features/assumptions of our model:

1. The principal and agent can contract with each other for two periods, where the principal can terminate the relationship after the first period.

2. The principal can terminate the relationship either because the grower did not perform up to expectations (for-cause-termination) or because exogenous economic events lower the expected profitability of continuing the contract in the second period.

3. Agent’s action space is defined by $E = [0, +\infty]$ in both periods so that so $e_t \in E$ is continuous. Action is also unobservable by the principal so that there is moral hazard.
Agent’s effort cost function is given by $c(e_i \mid I)$ with assumptions, $c(0 \mid I) = 0$, $c_e(e_i \mid I) > 0$, and is stationary across periods. The variable $I$ denotes an investment (in dollars) that the grower must make in order to secure a contract from the processor. We assume that $c_t(e_i \mid I) \leq 0$, $c_{et}(e_i \mid I) > 0$, $c_{ct}(e_i \mid I) \leq 0$, and $c_{ct}(e_i \mid I) > 0$ so that the investment improves the grower’s ability to farm by lowering the absolute and marginal effort costs but there are diminishing benefits to additional investments. Finally, we assume that the investment has a useful life of two periods.

The investment $I$ is relationship specific in that it is worth only $\lambda I$ in an alternative use or in an alternative contracting relationship where $\lambda \in [0,1]$. When $\lambda = 1$ there is no asset specificity and when $\lambda = 0$, the asset is completely specific to the relationship.

Define the following output probabilities:

a) $p(e_i) = \text{Prob}\{y_{it} \mid e_i\}$

b) $1 - p(e_i) = \text{Prob}\{y_{il} \mid e_i\}$

Also assume that output is independently distributed across periods so that first period quality outcomes reveal no information about second period quality outcomes.\(^4\)

Assume that the probability function satisfies the following conditions:

\(^4\) We allow for only two output levels to avoid overcomplicating the model. Had we allowed for three or more output levels, then we would need to impose additional conditions on the conditional probability distributions such as the monotone likelihood ratio condition and the convexity of the distribution function condition (See Grossman and Hart).
\[ p(e_t) \in (0,1) \]
\[ p'(e_t) > 0 \]
\[ p''(e_t) < 0 \]

7. The principal and the agent are risk neutral and have static payoffs of:

\[ \pi_t^p = p(e_t)[R(y_{it}) - w_{ht}] + [1 - p(e_t)][r(y_{it}) - w_{lt}] \]
\[ \pi_t^a = p(e_t)w_{at} + [1 - p(e_t)]w_{lt} - c(e_t | I) \]

in period \( t \), where \( w_{ht} \) and \( w_{lt} \) are contract payments made to the agent under high and low performance, respectively. To conserve on notation, we will let \( r = r(y_{it}) \) and \( R = R(y_{it}) \).

8. Assume limited liability so that \( w_{ht} \geq L \) and \( w_{lt} \geq L \), where \( L \) represents a lower bound on explicit payments contained in a contract. This makes the risk neutral problem non-trivial. Recall that with risk neutrality, first best is always achievable by making the agent the residual claimant. However, when there are limited liability constraints, then the problem is no longer trivial as the principal now is forced to consider the tradeoff between higher effort and limited liability rents.

9. The timing of the relationship is as follows:

**Period 0:** The principal (P) offers a single period contract to the agent (A). If A accepts, A must make the investment, \( I \), as required by P.

**Period 1:** A exerts effort \( e_1 \) which affects the probability distribution of quality. Subsequently, quality, \( y_{1k} \) is realized and a payment \( w_{1k} \) is made to the agent where \( k = L, H \).

**Period 2:** At the beginning of the period, P decides whether or not to continue the relationship with A. If the contract is renewed, A exerts effort \( e_2 \) and \( y_{2k} \) is
subsequently realized. After observing \( y_2 \), the payment \( w_{2k} \) is made to the agent.

Periods 1 and 2 are linked as follows. At the conclusion of period 1, the principal decides whether to renew the contract or not with the agent using one of two criteria. First, if the agent did not perform well, that is, if \( y_1 = y_L \), then the principal does not renew the contract. Second, an exogenous economic event can affect the downstream market for the principal so that the principal may no longer find it profitable to continue its operations, in which case it would “layoff” the grower.\(^5\) In the first case, the processor has a legitimate reason for terminating the grower, whereas in the second case, the processor essentially breaches its agreement with the grower, despite the fact that the grower performed well. While there is formally no long term agreement in our model, verbal agreements, which induced the grower to make the long term investment, \( I \), may be enforceable by a court of law because the grower can sue for “breach of faith.”

**First Best**

In a first best world with no moral hazard or asset specificity, define the second period surplus from trade by:

\[
S(e_2 \mid I) = p(e_2)R + (1 - p(e_2))r - c(e_2 \mid I)
\]

Taking the derivative with respective to effort and assuming an interior solution yields the first order condition:

\[
p'(e_2)(R - r) = c_e(e_2 \mid I)
\]

Letting \( e_2^* \) be the effort level that satisfies (2), we have,

\(^5\) For example, there could be a drop in downstream demand or a downturn in the economic cycle which forces the principal to eliminate some of its product lines.
Similarly, for period 1, we have:

\[ S(e_1^* | I) = \max_{e_1} p(e_1)R + (1 - p(e_1))r - c(e_1 | I) \]

where \( e_1^* \) satisfies the first order conditions:

\[ p'(e_1)[R - r] = c_e(e_1 | I) \]

To determine optimal investment, we maximize the time 0 objective function with respect to \( I \). However, before formulating the two period objective function, we allow for the possibility that an exogenous economic shock may affect second period surplus so that it may be negative in certain contingencies in which case it would be optimal for no exchange to take place in period 2. Define \( q = \Pr \{S(e_2^* | I) \geq 0\} \), then the expected surplus function at time zero is:

\[ \max_I S(e_1^* | I) + \delta qS(e_2^* | I) - I \]

where \( \delta \) is a common discount factor. Again, assuming an interior solution, the first order condition is:

\[ -\frac{\partial c(e_1^* | I)}{\partial I} - \delta q \frac{\partial c(e_2^* | I)}{\partial I} = 1 \]

so that optimal investment \( I^* \) satisfies (7). Note that conditions (2), (5) and (7) characterize the first best conditions for effort and investment when there is no moral hazard and no asset specificity.

**Optimality Conditions with Moral Hazard and Asset Specificity**

Now we will characterize the optimality conditions when there is moral hazard so that first best may not be achievable. In this case, the principal must design a contract that
will provide the agent with incentives to exert adequate effort. Also, it is a stylized fact that in some sectors, such as processing tomatoes and chicken broilers, long term contracts are rarely offered so that trade is governed by a sequence of short term contracts. As such, we model our two period contracting relationship by assuming that a contract lasts for only one period and then the principal has the option of renewing depending on the agent’s performance and/or exogenous economic conditions.

We solve the model through backward induction starting in period 2. Because this is the final period, the principal essentially is designing a static contract to motivate the agent to exert high effort. That is, the principal must solve:

\[
\max_{w_{2L}, \text{c}_2} \quad p(e_2)[R - w_{2H}] + (1 - p(e_2))[r - w_{2L}]
\]

s.t. \[\pi^d_2 = p(e_2)w_{2H} + [1 - p(e_2)]w_{2L} - c(e_2 | I) \geq \pi^d_2(\lambda I) \quad \text{(IR)}\]

\[p'(e_2)[w_{2H} - w_{2L}] = c_e(e_2 | I) \quad \text{(IC)}\]

\[w_{2H} \geq L \quad w_{2L} \geq L \quad \text{(LL)}\]

where \(\pi^d_2(\lambda I)\) represents the agent’s reservation profit or next best contracting opportunity. When the limited liability constraint (LL) is binding, then \(w_{2L} = L\), which limits the degree to which the principal can deliver incentives by “punishing” the agent via low payments. Instead, the principal is forced to use only carrots to motivate the agent to exert high effort and has to pay the agent rent via a high \(w_{2H}\) to ensure that there is adequate variation between \(w_{2H}\) and \(w_{2L}\). Because the principal is forced to pay excessive high \(w_{2H}\), the IR constraint is not binding and the agent earns rents over her next best opportunity.

Rewriting the incentive compatibility constraint (IC), we have:
(9) \[ w_{2H} = L + \frac{c_e(e_2 \mid I)}{p'(e_2)} \]

so that \[ \frac{c_e(e_2 \mid I)}{p'(e_2)} \] represents the size of the spread between the high and low payments and (9) gives us the optimal payment to the agent when \( y_2 = y_{2H} \). The incentive cost function for the principal is given by:

(10) \[ C_{2}^{IC} = p(e_2)w_{2H} + (1 - p(e_2))w_{2L} = L + \frac{p(e_2)}{p'(e_2)} c_e(e_2 \mid I) > c(e_2 \mid I) \]

The proof for the last inequality can be found in Wolfstetter (pg. 290) and suggests that, under moral hazard, it becomes more costly to implement a particular effort level than when moral hazard does not exist. This is because the principal must provide limited liability rents to the agent in order to get the agent to exert high effort. The incentive cost function (10) can be substituted into the principal’s objective function to get:

(11) \[
\max_{e_2} p(e_2)R + (1 - p(e_2))r - L = -\frac{c_e(e_2 \mid I)}{p'(e_2)}
\]

Note that (11) is analogous to (1) with the exception that the effort cost function is replaced with the incentive cost function. Letting

(12) \[ e_2^* = \arg \max_{e_2} p(e_2)R + (1 - p(e_2))r - L - \frac{c_e(e_2 \mid I)}{p'(e_2)} \]

we know that \( e_2^* < e_2^* \) because \( C_{2}^{IC} > c(e_2 \mid I) \) so that optimal second period effort under moral hazard is less than first best effort. We can then define second period payoffs for the principal and the agent, respectively, as follows:

(13) \[ \pi_e^p(e_2^* \mid I) = \max_{e_2} p(e_2)R + (1 - p(e_2))r - L - \frac{c_e(e_2 \mid I)}{p'(e_2)} \]
Having determined the second period payoffs, we can now examine behavior in period 1. However, we first remind the reader that we allowed for the possibility that an exogenous shock can create negative second period surplus. Note that $S(e^*_2 \mid I) > \pi^p_2(e^*_2 \mid I)$ so that the principal may earn negative profits sometimes even when first best surplus is greater than zero. This suggests that, due to moral hazard, the principal may sometimes breach the contract with a grower even if first best surplus is positive. Letting $v = \Pr ob(\pi^p_2(e^*_2 \mid I) \geq 0)$, then we know that $v < q$.

At the beginning of period 1, the principal’s expected profit will depend on both $p(e_i)$ and $v$ as these probabilities determine the likelihood that the principal will continue to contract with the same grower in the second period. Specifically, if a grower underperforms by producing low quality, which can occur with probability $1 - p(e_i)$, then the processor will terminate this grower and contract with another grower and earn profits $\pi^p_A$. However, even if the grower performs well, economic conditions can be unfavorable so that the principal still terminates the grower after period 1 with probability $v$. Thus, the principal’s first period objective function is:

$$
(15) \quad \pi^p_1 = p(e_i)\left[ R - w_{1H} + \delta v \pi^p_2(e^*_2 \mid I) \right] + (1 - p(e_i))\left[ r - w_{1L} + \delta v \pi^p_A \right]
$$

The agent’s ex ante profit function in period 1 is:

$$
(16) \quad \pi^A_1 = p(e_i)\left[ w_{1H} + \delta v \pi^4_2(e^*_2 \mid I) + \delta(1 - v)\pi^4_A(\lambda I) \right] + (1 - p(e_i))\left[ w_{1L} + \delta \pi^4_A(\lambda I) \right] - c(e_i \mid I)
$$
Taking the derivative of (16) with respect to $e_1$ yields the agent’s incentive compatibility constraint:

$$w_{tt} = L + \frac{c_r(e_1 | I)}{p'(e_1)} - \delta v \left[ \pi^A_2(e_2^* | I) - \pi^A_2(\lambda I) \right]$$

Comparing (17) to (9), one can see that the threat of termination along with asset specificity, as captured by $\pi^A_2(e_2^* | I) - \pi^A_2(\lambda I) > 0$, allows the principal to charge a lower incentive compatible payment to the agent when the agent produces high quality. If asset specificity did not exist, then the implicit incentives offered by the threat of termination would carry no weight and the principal would not be able to lower its payment to the agent. Note that the greater the asset specificity, the large the term $\pi^A_2(e_2^* | I) - \pi^A_2(\lambda I)$ and $w_{tt} \to L$. If $\delta v \left[ \pi^A_2(e_2^* | I) - \pi^A_2(\lambda I) \right] \geq \frac{c_r(e_1 | I)}{p'(e_1)}$, then $w_{tt} = L = w_{tt}$ in which case there would be no contingent pay whatsoever. The producer would be offered a fixed payment contract and effort would be motivated entirely by implicit incentives from the threat of termination.

We can now construct the first period incentive cost function for the principal which is:

$$C^i_{IC} = L + \frac{p(e_1)}{p'(e_1)} c_r(e_1 | I) - \delta v \left[ \pi^A_2(e_2^* | I) - \pi^A_2(\lambda I) \right]$$

Formally, the above points can be summarized as follows:

**Proposition 1:** Asset specificity combined with the threat of termination create implicit incentives, which,
i) allow the principal to reduce payment $w_{1H}$ to the agent by an amount equal to $\delta v \left[ \pi_2^A(e^*_2 | I) - \pi_2^A(\lambda I) \right]$, when

$$\delta v \left[ \pi_2^A(e^*_2 | I) - \pi_2^A(\lambda I) \right] \leq \frac{c_e(e^*_1 | I)}{p'(e^*_1)};$$

ii) result in a contract that offers no payment variation so that $w_{1H} = w_{1L}$ if

$$\delta v \left[ \pi_2^A(e^*_2 | I) - \pi_2^A(\lambda I) \right] \geq \frac{c_e(e^*_1 | I)}{p'(e^*_1)} \text{ because explicit incentives are crowded out by implicit incentives;}$$

iii) enable the principal to implement a higher effort level than what is possible under an explicit contract in a one-shot relationship with moral hazard.

In a paper by Andreoni, et. al. it was shown that optimal incentives are provided by both reward and punishment. Under limited liability, explicit punishment cannot be imposed on agents so that other instruments have to be in place. Asset specificity and termination are instruments that can be used to provide implicit punishment to growers.

Using (18), the principal’s ex ante first period objective function can be written as:

$$\pi^p_1(e_1 | I) = p(e_1)R + (1 - p(e_1))r + \delta v \left[ p(e_1)\pi^p_2(e^*_2 | I) + (1 - p(e_1))\pi^p_{A} \right] +$$

$$p(e_1)\delta v \left[ \pi_2^A(e^*_2 | I) - \pi_2^A(\lambda I) \right] - L - \frac{p(e_1)c_e(e^*_1 | I)}{p'(e^*_1)} \tag{19}$$

Now define,

$$\tilde{e}_1 = \arg \max_{e_1} \pi^p_1(e_1 | I) \tag{20}$$

which represents the optimal first period effort level implemented by the principal with moral hazard and asset specificity.
Breach Damages

Suppose that legislation is introduced which protects growers from undue termination when they have made large investments in new equipment and buildings in order to obtain a contract. For example, the Producer Protection Act contains a clause that gives growers the right to recover damages that are based on “…the value of the remaining useful life…” of the equipment and buildings. However, with asset specificity, it is difficult to interpret exactly what this means particularly when asset specificity is severe. For example, consider the extreme case where $\lambda = 0$ so that the investment $I$ is entirely asset specific. In this case, if the grower is terminated, there is no useful remaining life to the asset because the asset is completely worthless outside the currently relationship.

One can also interpret the “value of the remaining useful life” to mean the additional amount of profit that the grower could have earned had the grower not been terminated. In this case, damages would be calculated to be the difference between profits that can be earned with the current processor and profits from the next best opportunity in period 2. That is, we have:

$$D = \pi_2^d(e_2^* | I) - \pi_2^d(\lambda I)$$

which is the real amount that the grower loses from being terminated.

We also assume that the grower will be awarded damages if he/she performed adequately and is terminated anyways. If the grower performed poorly, then the processor has justification for terminating the grower and it is reasonable to assume that a court of law would agree with the processor’s reasons for termination. As such, the processor and grower’s new ex ante period 1 profit functions are:

$$\pi_1^p = p(e_1)\left[ R - w_{11r} + \delta \nu \pi_2^p(e_2^* | I) - \delta(1 - \nu)D \right] + (1 - p(e_1))\left[ r - w_{ik} + \delta \nu \pi_{-A}^p \right]$$
\( (23) \)
\[
\pi_i^A = p(e_i)[w_{1H} + \delta v \pi_2^A(e_i^2 | I) + \delta (1 - v) \left( \pi_2^A(\lambda I) + D \right)] + (1 - p(e_i))[w_{1L} + \delta \pi_2^A(\lambda I)] - c(e_i | I)
\]

Taking the derivative of (23) with respect to \( e_1 \) yields the incentive compatibility constraint:

\( (24) \)
\[
w_{1H} = L + \frac{c_i(e_i | I)}{p'(e_i)} - \delta v \left[ \pi_2^A(e_i^2 | I) - \pi_2^A(\lambda I) \right] - \delta (1 - v)D
\]

Equation (24) defines the optimal payment the principal makes to the agent when high output is observed under breach damages. While damages ostensibly impose a cost on the principal when the principal terminates the contract with the agent without cause, our model predicts that the principal indirectly passes this cost on to the agent via a lowering of \( w_{1H} \) by the amount \( \delta (1 - v)D \). Thus, the entire discounted expected damages are transferred to the agent so this regulation has no impact on grower welfare. Formally, we have,

**PROPOSITION 2:** If the government imposes breach damages on the principal, neither grower welfare or effort level implemented by the principal will be affected.

An additional implication of Proposition 2 is that damages are non-distortionary which suggests that breach damages will not affect social surplus. However, the assumptions under which Proposition 2 holds are rather restrictive as it is unlikely that the principal can transfer the expected cost of breach damages to growers without bound. Recall that the limited liability constraints prevent \( w_{1H} \) from falling below \( L \) so that if breach damages and/or asset specificity are large, then the principal will not be able to pass all
regulation costs to the agent via a reduction in $w_{1H}$. To see this, consider the following two cases.

**Case 1:** Suppose that the following inequalities hold:

$$\frac{c_s(e_s | I)}{p'(e_s')} > \delta v\left[\pi_s^4(e_s' | I) - \pi_s^4(\lambda I)\right] \quad \text{and} \quad \frac{c_s(e_s | I)}{p'(e_s')} \leq \delta v\left[\pi_s^4(e_s' | I) - \pi_s^4(\lambda I)\right] + \delta(1-v)D$$

which, combined with (24), implies that $w_{1H} > L$ when breach damages are not imposed by the government but $w_{1H} = L$ after damages are implemented. A government statute requiring processors to pay damages in the event of breach may actually reduce or eliminate explicit contingent pay. The intuition is that the processor will try to pass the expected costs of the damage liability to the grower by reducing $w_{1H}$ but at some point the processor is constrained by the limited liability constraint so the processor has to absorb some of the liability costs, which also reduces the power of implicit incentives. Without contingent pay (no explicit incentives) and with implicit incentives weakened, the principal now faces higher incentive costs.

**Case 2:** Suppose that the following inequality holds:

$$\frac{c_s(e_s | I)}{p'(e_s')} \leq \delta v\left[\pi_s^4(e_s' | I) - \pi_s^4(\lambda I)\right]$$

In this case, $w_{1H} = L$, even without damages so if the government imposes damages, the processor cannot pass on the expected liability to growers via reduced explicit payments.

The above two cases lead to our third proposition.
PROPOSITION 3: Assume that the conditions specified in Case 1 or Case 2 hold. If the government imposes breach damages on the principal, then the cost of managing first period moral hazard will increase for the principal, resulting in a distortion whereby first period effort will be distorted downward away from $\tilde{e}_1$.

Proposition 3 states that government policy can create distortions if either asset specificity is severe and/or damages are large. The implication here is that, while asset specificity can make growers extremely vulnerable in short term contracting relationships, it is precisely in such environments that regulations might be highly distortionary. Thus, policy makers seeking to protect growers from undue termination face the tradeoff between decreased grower vulnerability and increased agency costs that may diminish the ability of processors to manage moral hazard. Moreover, if excessive regulation is imposed via large breach damages, it is possible that processors may be handcuffed in their ability to maintain quality in their production chains which could reduce product innovation that require unique inputs.

**Discussion and Conclusion**

The analysis conducted in this paper leads to a rather negative conclusion about the possible social benefits of termination damages as a means of improving grower welfare. Breach damages appear to be least distortionary when there is minimal asset specificity, but this also happens to be the case when they are least needed because growers are not too vulnerable. On the other hand, when asset specificity is large and growers are vulnerable, breach damages can be highly distortionary and may lead to unintended consequences that can increase the costs of managing of moral hazard and possibly lead
to reduced productivity. Thus, policy makers face a conundrum as they must weigh the consequences of protecting one group at the expense of other sectors of the economy.

An issue that was not discussed but merits further research is that if increasing investments in $I$ can enhance principal profits by lowering effort costs of agents, then processors may force growers to invest until their participation constraints are binding. Thus, even if breach damages can increase grower welfare, it is likely that processors can extract any welfare gains achieved by growers via more demanding investment requirements that benefit the processors but impose costs on growers.

Perhaps there are alternative means of protecting growers. One possibility is for policy makers to focus on policies that can enhance growers’ reservation utilities. For example, Lewin suggest that collective bargaining can be a “flexible” way of protecting growers and could enhance grower bargaining power. This would suggest that legal rules that protect grower rights to organize collectively can indirectly enhance grower bargaining power. Anti-trust policies that protect alternative marketing channels may also keep growers from being held hostage because of low reservation utilities. This is an important area of future research for agricultural economists.
References


Appendix

**Proof of Proposition 1:** Parts (i) and (ii) follow trivially from (16) and the assumption of limited liability. To prove part (iii), using the logic used to derive (9), the one shot incentive cost function in period 1 would be \( C_{1}^{IC} = L + \frac{p(e_1)}{p'(e_1)} c_e(e_1 | I) \) which is greater than (17). Because it is now cheaper to provide effort incentives, the principal implements a higher level of effort and moves closer to the first best level.

**Proof of Proposition 2:** From (23), we can construct the incentive cost function for the principal,
\[
C_{1}^{IC} = p(e_1)w_{1H} + (1 - p(e)) = L + \frac{p(e_1)c_e(e_1 | I)}{p'(e_1)} - p(e_1)\delta v\left[\pi_2^A(e_1' | I) - \pi_2^A(\lambda I)\right] + \frac{p(e_1)\delta v\left[\pi_2^A(e_2' | I) - \pi_2^A(\lambda I)\right] - c_e(e_1 | I)}{p'(e_1)}
\]
Which can be substituted into the principal’s objective function to get:
\[
\pi_1^p(e_1 | I) = p(e_1)R + (1 - p(e))r + \delta v\left[p(e_1)\pi_2^p(e_1'/ I) + (1 - p(e_1))\pi_2^p(e_2'/ I)\right] + \frac{p(e_1)\delta v\left[\pi_2^A(e_1' | I) - \pi_2^A(\lambda I)\right] - c_e(e_1 | I)}{p'(e_1)}
\]
However, this is identical to (18) so that the effort level the principal chooses to implement is identical to the effort level specified in equation (19). Similarly, the incentive cost function can be substituted into the grower profit function (22) to show that the presence of breach damages does not affect grower profit.

**Proof of Proposition 3:** We begin by examining case 1. By assumption,
\[
\frac{c_p(e_1 | I)}{p'(e_1)} > \delta v\left[\pi_2^A(e_1' | I) - \pi_2^A(\lambda I)\right] \quad \text{and} \quad \frac{c_e(e_1 | I)}{p'(e_1)} \leq \delta v\left[\pi_2^A(e_1' | I) - \pi_2^A(\lambda I)\right] + \delta (1 - v)D
\]
Define \( \hat{D} = \frac{c_e(e_1 | I)}{\delta (1 - v)p'(e_1)} - \frac{\delta v\left[\pi_2^A(e_1' | I) - \pi_2^A(\lambda I)\right]}{1 - v} \). Note that the incentive cost function with damages is now given by,
\[
C_{1}^{IC,D} = L + \frac{p(e_1)}{p'(e_1)} c_e(e_1 | I) - \delta p(e_1)\delta v\left[\pi_2^A(e_1' | I) - \pi_2^A(\lambda I)\right] - p(e_1)\delta (1 - v)\hat{D}
\]
By assumption, \( \frac{c_e(e_1 | I)}{p'(e_1)} \leq \delta v\left[\pi_2^A(e_1' | I) - \pi_2^A(\lambda I)\right] + \delta (1 - v)D \), so we can easily see that \( D \geq \hat{D} \) and the last term in the principal’s objective function, \( p(e_1)\delta (1 - v)\left[ D - \hat{D} \right] \) must be non-negative which implies that the principal faces incentive costs that are higher than incentive costs without regulation. Consequently, it must be true that the optimal effort level chosen under Case 2, which we denote as \( e_{1}^{D2} \), must be less than or equal to \( \tilde{e}_1 \).
Turning to case 2, we have by assumption, that \( \frac{c_v(e_i | I)}{p'(e_i)} \leq \delta v \left( \pi_2^A(e_s^i | I) - \pi_2^A(\lambda I) \right) \). In this case, even without government regulation, the principal’s incentive is simply \( C_1^{IC,D} = L \). Substituting this into the principal’s objective function (22) yields,

\[
\pi_1^p = p(e_i)R + (1 - p(e_i))r + \delta v \left[ p(e_i)\pi_2^p(e_s^i | I) + (1 - p(e_i))\pi_{A_+}^p - L - \delta(1 - v)D \right]
\]

Now, using (21), we can substitute for \( D \) to get:

\[
(D.3) \quad \pi_1^p = p(e_i)R + (1 - p(e_i))r + \delta v \left[ p(e_i)\pi_2^p(e_s^i | I) + (1 - p(e_i))\pi_{A_+}^p \right] + p(e_i)\delta v \left[ \pi_2^A(e_s | I) - \pi_2^A(\lambda I) \right] - L - p(e_i)\delta \left[ \pi_2^A(e_s^i | I) - \pi_2^A(\lambda I) \right]
\]

Comparing this objective function to (19), one can see that the main difference is that \( \frac{p(e_i)c_v(e_i | I)}{p'(e_i)} \) in (19) has been replaced by \( p(e_i)\delta \left[ \pi_2^A(e_s^i | I) - \pi_2^A(\lambda I) \right] \). By assumption, we know that \( \frac{c_v(e_i | I)}{p'(e_i)} \leq \delta v \left( \pi_2^A(e_s^i | I) - \pi_2^A(\lambda I) \right) \) and therefore

\[
\frac{p(e_i)c_v(e_i | I)}{p'(e_i)} < p(e_i)\delta \left[ \pi_2^A(e_s^i | I) - \pi_2^A(\lambda I) \right] \quad \text{since} \quad v < 1.\]

Thus, letting \( e_1^{D3} \) denote the effort level that maximizes (D.3), we have \( e_1^{D3} < \tilde{e}_1 \).