CHAPTER 28

INTER-PERIOD CONTRACT RENEGOTIATION

Chapter 24 considers a single-period setting in which the initial contract is renegotiated after the agent has taken his action, but before the outcome has been reported. From an *ex ante* perspective (i.e., at the time of the initial contract), permitting renegotiation can be beneficial if it takes place after the principal receives non-contractible information about the agent's action.[1] However, in a setting in which all signals are directly contractible, the principal is generally better off *ex ante* if he can exclude the possibility of future renegotiation (even though both parties may prefer to renegotiate *ex post*). On the other hand, while renegotiation is generally *ex ante* inefficient, it may be difficult (or impossible) for the principal and the agent to commit themselves not to engage in *ex post* mutually beneficial renegotiation.

Chapters 25, 26, and 27 consider multi-period models in which it is assumed that full commitment is possible, i.e., renegotiation can be precluded. This chapter also considers multi-period models, but assumes full commitment is not feasible. More specifically, we assume that the principal and agent cannot preclude inter-period renegotiation of a long-term contract (i.e., at the end of a period). However, we do assume they can preclude intra-period renegotiation (i.e., prior to the end of a period). We also exogenously exclude contracts in which the agent randomizes over actions.

Section 28.1 considers a set of sufficient conditions under which a sequence of short-term contracts can provide the same expected utilities to the principal and the agent as can an efficient long-term contract with no renegotiation. One of the key conditions is that at the beginning of each period the future technological opportunities are common knowledge, i.e., conditional on public information the agent's past unobservable actions do not have any impact on the distribution of future outcomes and performance measures.

Section 28.2 examines the impact of inter-period renegotiation in a two-period model with exponential *AC-EC* preferences, normally distributed performance measures, and payoff functions similar to the *LEN* and *QEN-P* models in Chapter 27. The performance measures may be correlated across periods, and actions may have long-term effects on outcomes as well as on performance

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[1] In that setting, renegotiation facilitates implicit contracting on the otherwise non-contractible information.

measures, i.e., future technological opportunities are *not* common knowledge. The performance measures are transformed into stochastically independent performance statistics, which may be technologically interdependent (from the agent's perspective). Furthermore, the first measure (or statistic) may be informative about the productivity of the second-period action.

Initially, a first-order approach is used to characterize the optimal renegotiation-proof contract. In renegotiating the second-period contract, the principal solves a one-period problem using the information available at the start of the second period. In choosing the first-period contract the principal takes the solution to the second-period problem as given, rather than determining the two contracts simultaneously (as in the full-commitment setting). Nonetheless, as with full commitment, the induced first-period action with renegotiation is shown to be the result of up to three types of incentives. First, there is a direct incentive that applies in all settings. Second, there is an indirect "posterior-mean" incentive which applies if the performance measures are correlated, and is due to the impact of the first-period action on the second-period statistic. Third, there is an indirect "covariance" incentive that applies if the second-period contract varies with the first-period performance measure. Contrary to the full-commitment setting, the latter incentive only applies if the first-period performance measure is informative about the productivity of the second-period action.

As in Chapter 27, after characterizing the optimal contracts, we characterize the optimal linear contracts.[2] In this setting the contract for period *t* is restricted to being a linear function of the performance measure for period *t*. However, due to renegotiation, the second-period "fixed wage" and incentive rate vary with the first-period performance measure if it is informative about the productivity of the second-period action and the performance measures are correlated. This approach implicitly produces contracts similar to the *QEN-P* contracts in Chapter 27.

The correlation between the two performance measures plays a central role in determining the difference in payoffs and first-period actions given renegotiation versus full commitment. To explore these differences, we provide comparative statics for a setting in which the two periods are identical. If the first-period performance measure is uninformative about the productivity of the second-period action, the contract with renegotiation will be a renegotiation-proof *LEN* contract, i.e., the indirect first-period covariance incentive in the full-commitment setting cannot be sustained with renegotiation. In the setting with productivity information, the correlations between the two performance measures and between the first-period performance measure and the second-period productiv-

[2] Our model is similar to the dual purpose model in Feltham *et al.* (2005). They also consider a setting in which information about the marginal productivity of second-period effort is provided by a separate report. The dual purpose report can be preferred to the special purpose report if there is renegotiation. However, the latter clearly dominates if there is full commitment.