

Chapter 24

BARGAINING GAMES WITH JOINT PRODUCTION

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Bargaining commonly goes on between people who have produced the bargaining pie they have to divide. Yet current research on negotiation often abstracts away from the production stage. Emin Karagözoğlu overviews the methodology and results of recent studies in which both production and division are endogenous. The studies show how the pie gets created influences what we observe at the bargaining table.

Following the seminal works of Rubinstein (1982) and Güth, Schmittberger, and Schwarze (1982), there has been a surge in experimental research on bargaining in noncooperative games. Findings in the 1980s and 1990s challenged some basic concepts in mainstream economic theory (e.g., fully selfish man) and game theory (e.g., subgame perfection) and reshaped our understanding of human behavior in strategic interactions. One can comfortably say that the theoretical developments on social preferences, inequity aversion, and reciprocal behavior stem—at least partially—from the quest for answers to questions raised by the striking results obtained in bargaining experiments.

A vast majority of bargaining studies in experimental economics in the 1980s and 1990s used simple bargaining protocols such as the ultimatum game, the dictator game, or the Nash bargaining game. Importantly, for almost all of these studies, the bargaining pie (or bargaining surplus) to be shared was manna from heaven provided by the experimenter. However, most real-life bargaining situations involve a surplus that has to be produced, often by the bargainers themselves. Examples include labor-management negotiations, conflicts over income distribution at a national level (e.g., who gets what share of the gross domestic product), negotiations between political parties (over who gets which ministries) during

coalition-building processes following elections, and negotiations between television channels and sports clubs over the revenues from broadcasting sports matches on television. Besides these particular examples, we are witnessing an increasing popularity of team-production and incentive schemes based on team performance in organizations, which also makes the study of bargaining problems with joint production a highly relevant research program.

From a purely standard theoretical point of view, whether the surplus is produced by the bargaining parties or not should not make a difference since the costs incurred by the bargaining parties due to the production of the pie (e.g., cost of effort, investment, contribution) are sunk at the time when they sit at the bargaining table and thus should not affect bargaining behavior. Yet empirical evidence suggests the opposite: Agents' behaviors are heavily influenced by sunk costs they previously incur (see Phillips, Battalio, and Kogut, 1991; Hackett, 1993, among others). This suggests that studying bargaining games with joint advance production is important for our understanding of real bargaining behavior.

Distributive justice and bargaining problems involving production have been studied (mostly with vignettes) in sociology and social psychology since the 1960s (see Adams, 1965; Deutsch, 1975; Messick and Sentis, 1979; Schwinger, 1980; Messick and Cook, 1983; Griffith, 1990; Scott, Matland, Michelbach, and Bornstein, 2001, among others). Economists, in contrast, have started working on the topic quite recently.

In this chapter, I review the literature on experimental bargaining and distribution games with joint production. Almost all studies in this literature have been produced in the last decade. To give the reader a broader and up-to-date perspective on the developments in the area, I at times mention studies that are still in progress. In the first section, I report findings from experiments in which the production is realized by subjects' monetary investments. In the second section, I report findings from experiments in which the

production is realized by subjects' performances in a real effort task. Finally, I conclude by outlining potential venues for future research on the topic.

Producing the “pie” with monetary investments

In light of the results on bargaining without joint production, one of the most natural questions in the study of bargaining problems with joint production is about the multiplicity of fairness notions in such an environment. In a symmetric bargaining game without production, many people would agree that the equal-split is the indisputable fairness notion that determines agents' bargaining behavior; and experimental studies show that this is the case (see Nydegger and Owen, 1975). On the other hand, when the pie is produced jointly, a subject's deservingness is likely to be influenced by his contribution to the joint production activity (e.g., in a Lockean desert fashion¹). Therefore, norms based on equity and equality likely coexist and influence subjects' bargaining behavior along with strategic considerations. Furthermore, different forms of the equity norm may prevail due to different reference points (e.g., gains vs. losses, performances vs. contributions).

Gantner, Güth, and Königstein (2001) study subjects' bargaining behavior in ultimatum and Nash demand games in the presence of joint production.² The production function they employ is additive and asymmetric: $r = 3q_l + 6q_h$, where r stands for the jointly produced output and q_i is the individual cost induced by investing q_i ($i = l, h$). Subjects' productivity types (i.e., low or high) are randomly determined before the investment stage and their roles in the ultimatum game (i.e., proposer or responder) are determined after the investment stage. Subjects can choose q_i from $\{0, 1, \dots, 50\}$. Subjects take these costly investment decisions simultaneously. The authors compare the game theoretical predictions with equity-based predictions.

Another novelty of Gantner et alia design is that the authors require subjects to submit a demand vector rather than a single demand or proposal. Specifically, subjects submit $d =$

demand and a = acceptance bound, which allows strategic and equity concerns to be observed in possibly various forms: It might be that both d and a are chosen strategically or both on the basis of equity or one of them is chosen on the basis of equity and the other strategically.

The analysis of aggregate behavior strongly rejects game theoretical predictions and shows that at least some subjects behave in line with equity-based considerations. The analysis of individual behavior shows that more than 60 percent of d (demand) choices and more than 30 percent of a (acceptance bound) choices are classified as equitable. Purely strategically determined choice vectors are rarely observed. Moreover, the equity-based behavior becomes more widespread with experience.

In concept, there are multiple equity-based solutions to bargaining problems posed in the Gantner et alia design. It is possible that subjects base their equity calculations on different standards: investments (q_l or q_h), contributions to joint return ($3q_l$ or $6q_h$), or contributions to joint surplus ($3q_l - q_l$ or $6q_h - q_h$). The authors find that subjects appear to employ equity considerations based on different standards.

In a related study, Cappelen, Hole, Sørensen, and Tungodden (2007) study multiplicity of fairness ideals in a dictator game. They focus on three prominent fairness ideals: strict egalitarianism, libertarianism, and liberal egalitarianism. Strict egalitarianism stipulates that, independent of differences in contributions, all inequalities should be eliminated. Libertarianism favors giving to each person on the basis of what he or she produced. Finally, liberal egalitarianism differentiates between the factors under a person's control and the ones not under his or her control: It stipulates that only the inequalities resulting from the factors under a person's control should be reflected in an allocation.

Similar to the ones in Gantner, Güth, and Königstein (2001), the subjects in this experiment are randomly assigned productivity levels (a factor not under their control).

Subjects start the experiment with 300 Norwegian kroner (NOK; approximately \$50). Each subject can invest in the joint product by choosing an amount of investment, 0, 100, or 200. Subjects make this decision twice for two separate distributional problems involving production, without knowing the result of the first decision. Their total investment in these two decisions cannot be larger than their endowment of 300 NOK. A high-productivity subject's investment is quadrupled, and a low-productivity subject's investment is doubled.³ After they make their investment decisions, they start the distribution phase. For each distributional problem, subjects are informed about the other participant's rate of return, investment, and produced income. Then they decide on the distribution. For each subject, one of the proposals in one of the distributional problems is chosen and applied. Thus, it comes down to a dictator game with joint production, in which the dictator is randomly chosen and roles are not known in advance in a pair.

Sociologists and social psychologists have studied similar problems in similar settings (see Cook and Hegtvedt, 1983, for a review). However, the major novelty of Cappelen et alia study is that the authors simultaneously (and structurally) estimate the prevalence of different fairness ideals and the weight people attach to these ideals with a random utility model. This enables them to distinguish between self-serving biases observed in many studies of this sort and true preferences for fairness.

Based on their preferred model specification, the authors report that 43.5 percent of their subjects can be classified as strict egalitarians, 38.1 percent as liberal egalitarians, and 18.4 percent as libertarians. Therefore, each fairness ideal is shared by a considerable percentage of the subject pool.

The analysis of the weights subjects attached to fairness ideals shows that about 35 percent of the subjects almost do not attach any weight to their fairness ideal, another 35

percent act mostly in line with their fairness ideals, and the remaining 30 percent of the subjects opt for an intermediate solution between their fairness ideals and selfish choices.

Producing the “pie” with real effort

Königstein (2000), Gantner, Güth, and Königstein (2001), and Cappelen, Hole, Sørensen, and Tungodden (2007) all show that the presence of monetary contributions to the surplus influence subjects' bargaining behavior. However, as Fischbacher, Kairies, and Stefani (2009) explain, it may be difficult to distinguish preferences for an equal split from preferences for fairness based on performances in an experimental design without actual performance or effort (pg. 3). In addition, one may argue that subjects derive stronger entitlements from exerting costly effort in a real-effort task compared to investing a part of the money given to them by the experimenter. In a sense, surplus production via real-effort task mimics relevant real-life instances to a greater extent. In this part, we review studies on bargaining games in which production is realized through real effort.

Hoffman, McCabe, and Smith (1996) have shown that subjects in an anonymous dictator game (without production) share the surplus in a non-negligible number of cases and in contrast to game theoretical predictions. Cherry, Frykblom, and Shogren (2002) study similar games but with production. In the production phase of their experiment, subjects who will assume the role of a dictator perform a real-effort task (answering 17 questions taken from Graduate Management Admission Test question pool in 45 minutes). At this stage, these subjects are not informed of the nature of the distribution phase that will follow. In the distribution phase, they dictate a distribution of the surplus (either \$10 or \$40, depending on their performance) they created in the production phase. The authors report that in the baseline treatment without production, theoretically predicted zero offers occur in 19 percent and 15 percent of cases in low stakes (\$10) and high stakes (\$40), respectively. This frequency increases to 97 percent in the treatment with production. Moreover, with the

anonymity (between the experimenter and subjects) other-regarding behavior is almost completely eliminated.

Fischbacher, Kairies, and Stefani (2009) study the same question as Cappelen, Hole, Sørensen, and Tungodden (2007) but with an ultimatum game, real-effort task, and, in some cases, multiplicative marginal productivities. The real-effort task takes the form of answering a single multiple-choice question. The joint output is 20 (100) points if both subjects in a pair give a wrong (correct) answer. The joint output, in case only one subject in a pair gives a correct answer, is varied and can take the value of 30, 60, or 90. Furthermore, to distinguish between fairness concerns and strategic concerns, the authors manipulate the relative bargaining power in two treatments: an ultimatum game treatment and a third-party treatment. In the third-party treatment, a subject who is not a member of the pair in question dictates a distribution for that pair.

Their main results are (i) an equal split is employed by the subjects only when either both subjects in a pair give the correct answer or the wrong answer, (ii) the input-based fairness ideal (i.e., libertarianism in Cappelen, Hole, Sørensen, and Tungodden, 2007) does not predict the behavior in the data, and (iii) the performance-based fairness ideal (i.e., liberal egalitarianism in Cappelen, Hole, Sørensen, and Tungodden, 2007) explains the data to the greatest extent, for example, subjects who were responsible for creating the joint output received a larger share. However, this share was independent of the subject's marginal productivity. This result can—at least partially—be attributed to the fact that a clear reference point is not provided to subjects in this experiment. Finally, the authors report that there is no difference between the results in the ultimatum game treatment and the third-party treatment, which implies that subjects' relative bargaining power does not play a role. All in all, the results of this study are similar to the ones in Cappelen, Hole, Sørensen, and Tungodden (2007), despite differences between their designs.

Konow, Saijo, and Akai (2009) study a dictator game with joint production to investigate subjects' preferences for equality and equity norms. They control for a wide range of personal characteristics (e.g., age, gender, income, culture, nationality). In contrast to Fischbacher, Kairies, and Stefani (2009), who found no difference across ultimatum game and third-party treatments, Konow, Saijo, and Akai (2009) find that impartial observers tend to use equity norms in their allocation decisions more than stakeholders do. As the anonymity between stakeholders is lifted, convergence to equality becomes more widely observed. Their results suggest that subjects in all treatments value equity norms but simply to differing degrees.

Cappelen, Sørensen, and Tungodden (2010) study the factors people hold others responsible for when they make distributive decisions. In the production phase of their experiment that consists of typing a text, subjects are potentially differentiated on the basis of three factors: working time (q), productivity (a), and the price they receive per unit they produce (p). Subjects choose their working time (either 10 or 30 minutes), whereas productivity (correctly typed characters per minute) possibly depends on innate abilities beyond the subjects' control. The price is randomly given, and so is totally beyond the subjects' control. Subject i 's production value is $x_i(a_i, q_i, p_i) = a_i q_i p_i$, and the amount to be distributed in a randomly formed pair is $X = x_1(a_1, q_1, p_1) + x_2(a_2, q_2, p_2)$. The main research question here is: "Which factors do subjects hold others responsible for?"

After finishing the real-effort task, each subject is randomly matched with at most six other subjects in succession and asked to dictate a distribution of the respective X amount for that pair. Subjects are given information about the other party's a , q , and p values. For each subject, only one of the decisions among all the distributive problems he or she is involved in is chosen for payment. Therefore, again, the payoffs are determined in a dictator game.

The authors enrich the set of fairness ideals by differentiating between choice egalitarianism and meritocratism, which were grouped under liberal egalitarianism in Cappelen, Hole, Sørensen, and Tungodden (2007). Choice egalitarianism considers an inequality as fair if it reflects differences in people's choices. On the other hand, meritocratism holds people responsible—independent of their choices—for a broader set of personal characteristics such as ability, talent, and productivity (see Arrow, Bowles, and Durlauf, 2000). Table 24.1 shows which fairness ideal implies which responsibility set in this new categorization:

INSERT TABLE 24.1 HERE

Therefore, strict egalitarianism does not hold agents responsible for any factor, libertarianism holds them responsible for all possible factors, and choice egalitarianism and meritocratism are in between these two opposing extremes. In particular, choice egalitarianism stipulates that agents should not be held responsible for factors beyond their control (a and p here), whereas meritocratism stipulates that agents should be held responsible for all factors that can be considered personal traits, which implies that subjects who subscribe to this fairness ideal would hold others responsible for productivity (a) and working time (q).

The authors structurally estimate a random utility model to arrive at predictions for the prevalence of different fairness ideals and the weight subjects attach to them.⁴ Their major findings are: (i) a majority of subjects hold others responsible for their working time, rejecting the strictly egalitarian view, (ii) a majority of subjects did not hold others responsible for randomly assigned price, rejecting the libertarian view, and (iii) a majority of subjects hold others responsible for their productivity, supporting meritocratism. It is interesting to see that subjects differentiate between price and productivity, both of which are out of subjects' control.

Gächter and Riedl (2005) have shown that subjective entitlements (or moral property rights) considerably influence bargaining behavior. In their experiment, there is a real-effort task (a general knowledge quiz), but the pie size subjects bargain over is fixed and independent of subjects' performances in the quiz. Karagözoğlu and Riedl (2011), in a similar setting, turn this real-effort task to a joint production activity and study the influence of subjective entitlements under different (un)certainty conditions. In contrast to other studies on bargaining with production, which use ultimatum, dictator, or Nash demand games, they use an almost free-form bargaining game, in which there is no fixed bargaining protocol. Subjects have 10 minutes to strike a deal. If they cannot reach an agreement in 10 minutes, they each receive zero payoffs. This design allows the authors to analyze a rich set of layers of the bargaining process: opening proposals, concessions, bargaining duration, and agreements.

In Karagözoğlu and Riedl's experiment, each subject in a randomly and anonymously formed pair answers multiple-choice questions in a general knowledge quiz. Subjects' joint performance can potentially determine the surplus they later will bargain over. The authors have a 2x2 experimental design in which they manipulate the presence of relative performance information and a stochastic factor influencing the production of the surplus. Consequently, they have four treatments: no performance information—stochastic production, no performance information—deterministic production, performance information—stochastic production, and performance information—deterministic production. When relative performance information is given to the subjects, it is only rank information (i.e., better or worse performer). When the production is deterministic, the size of the surplus depends purely on the joint performance of the subjects in a pair. The production function is additive. There are three possible sizes of surplus. When the production is stochastic, with a 25 percent chance the size of the surplus is determined, again, purely on the basis of joint

performances and with a 75 percent chance it is determined purely randomly. The treatments in this design resemble many real-life problems involving parties that negotiate over the jointly produced surplus in the presence of uncertainties about their contributions to the surplus.

The Karagözoğlu and Riedl data suggests an interesting interaction between the influence of (or the absence of) relative performance information and the influence of randomness in the production process. In particular, the authors find that the presence/absence of relative performance information influences the bargaining process (i.e., opening proposals, concessions, duration, and agreements) independent of the nature of the production process, whereas the presence/absence of randomness in the production process influences the bargaining process only when relative performance information is present. To be more precise, when there is performance information (and production is deterministic), opening proposals become more aggressive, concessions are lower and later, duration is longer, and agreements are more skewed away from an equal split in favor of the higher performer (in the quiz). This change appears to be mainly driven by the presence of (performance) rank information. Absent this information, the uncertainty in production or subjects' joint performance in the real-effort task (reflected on the size of the surplus) does not create any bargaining asymmetries.

The regression analyses reveal that the subjects' fairness judgments (subjective entitlements) influence their bargaining behavior only when there is relative performance information. Moreover, a closer look at the results leads to yet another interesting finding: The influence of fairness judgments on bargaining behavior is stronger when there is randomness in the production process. Some of the explanations for this result can be attributed to the fact that uncertainty in the production process gives subjects more moral wiggle room.

Rode and Le Menestrel (2011) study the influence of decision power on bargaining with production. In their design, one of the randomly matched subjects in each pair is labeled as active and the other as inactive. The active subject performs a real-effort task: counting letters in different parts of a text. The inactive subject is not assigned a particular job; he or she can read newspapers or do homework. If the active party succeeds in the task (i.e., completion within 20 minutes), a surplus of €16 is created. Three euros of this amount go to each subject, and the remaining €10 are to be divided. This design creates an extreme form of asymmetric contributions to the jointly produced surplus as in Cherry, Frykblom, and Shogren (2002): Although both parties are needed for the surplus to be realized, only one party is actively involved in the production.

Rode and Le Menestrel (2011) vary the distributive power of subjects in three treatments. In one treatment, the active subject decides on the division, whereas in the other, the inactive subject decides. These two treatments are variants of a dictator game. In the third treatment, two subjects make repeated, simultaneous offers. In case of disagreement, subjects are informed of their counterparty's offer and allowed to make a new offer. The process continues until they reach an agreement. As in Gächter and Riedl (2005) and Karagözoğlu and Riedl (2011), the authors also ask subjects' fairness judgments to see whether the power distribution influences them. Table 24.2 reports subjects' mean fairness judgments and active subjects' mean shares in agreements in active subjects' shares in all treatments:

INSERT TABLE 24.2 HERE

Power distribution appears to influence fairness judgments. In particular, as the subjects' distributive power increase, they start to believe that they deserve more (7.2, 7.5, and 8.5 for actives; 3.3, 3.7, and 4.7 for inactives). Secondly, although when inactives decide on the division they seem to use their power to obtain a high share (7.4), they do not use it to the extent used by actives, who obtain 9.1 when they decide on the division. This is probably

due to the fact that actives believe that they deserve to hold this power (i.e., its use is justified), whereas for inactives it may be less easy to do so. Finally, when the power is equally distributed, actives can get only a minor advantage over inactives (5.7 vs. 4.3).

In his seminal piece on bargaining, Thomas Schelling (1960) wrote

“Some institutional and structural characteristics of bargaining situations may make the commitment tactic easy or difficult to use, or make it more available to one party than the other, or affect the likelihood of simultaneous commitment or stalemate.”

Bolton and Karagözoğlu (in progress) use an experimental design that is similar to Gächter and Riedl (2005) and Karagözoğlu and Riedl (2011) to study the interaction between hard leverage (commitment tactics) versus soft leverage (focal points) in bargaining. Commitment tactics have been studied mostly in sequential bargaining games (e.g., ultimatum game), and focal point tactics have been studied mostly in simultaneous bargaining games (e.g., Nash demand games) in the past. In between these two extremes, there are many other bargaining structures where commitment and focal point tactics may interact. To the best of my knowledge, Bolton and Karagözoğlu (in progress) is the first study analyzing the interaction between these two tactics in a rich free-form bargaining context.

In Bolton and Karagözoğlu (in progress), the soft leverage (focal point) is identical whereas the hard leverage varies across treatments. Therefore, soft-leverage hypotheses would imply that subjects' fairness judgments and agreed shares do not differ across treatments whereas hard-leverage hypotheses would state that fairness judgments and agreed shares are more favorable for high performers whenever they have more hard leverage.

The authors report that only soft leverage determines subjects' fairness judgments but surprisingly not hard leverage. The focally favored bargainer receives a larger share of the jointly produced surplus in all treatments; marginally more (but still lower than what his or her imposed reference point indicates) in the hard-leverage treatment. More interestingly,

there is no difference in shares across soft-leverage and combined-leverage treatments. All in all, knowing the focal point provides a better forecast of outcomes than does knowing whether there is hard leverage.

Corgnet, Sutan, and Veszteg (2011) study some interesting questions such as “How are teams formed?” and “Why or when are they dissolved?” in the presence of bargaining with joint production. The major difference between the real-effort task they employ and real-effort tasks employed by the other studies mentioned is that subjects work side by side on different parts of the task and communication at this stage is allowed. Then subjects are asked their assessment of their contributions to the group output and their minimum acceptable share of the jointly produced output. They are also asked the share of the group output they would claim in order to perform another group task with the same person.

The authors report that most subjects’ self-assessments of their contribution are around 50 percent. Their minimum acceptable shares are also not significantly different from 50 percent. More interestingly, subjects tend to maintain inefficient teams using an equality norm in the presence of opportunities to form more efficient teams.

These results can be partially explained by two factors. First, the authors use an equal split in defining individual earnings in the instructions (“Your individual earnings will be computed as the half of your group earnings”). Such a reference point may anchor subjects’ preferences unless subjects’ self-assessments are drastically different from 50 percent. Second, we know from earlier studies (see Halpern, 1992; Polzer, Neale, and Glenn, 1993) that subjects tend to be more generous and agreeable when they are matched to a friend rather than a stranger. Working on the production task sitting side by side and chatting may help them in forming a social relationship similar to friendship.

Conclusion

The experimental economics literature on bargaining games with joint production is fairly new. Studies in the last decade show that the presence of joint production greatly influences bargaining behavior. With asymmetries in the production activity, norms and focal points other than the equal split start playing a role, and equity-based behavior based on different criteria is observed in non-negligible number of instances. Studies also show that most of the time the choice between equality, equity, and other, sometimes self-serving, fairness criteria is context dependent: It depends on factors such as the nature of the relationship (e.g., outsider or stakeholder), the level of anonymity (e.g., anonymous or nonanonymous), inequality implied by different norms, or factors in and out of agents' control. Future studies in the area should be able to come up with a more thorough categorization of situations establishing where each norm is used most frequently.

The presence of joint production also suggests the need for an enriched bargaining model, one that brings together the influences of factors such as performance information, uncertainties in production, power distribution, and group formation.⁵ Not surprisingly, there are still numerous open questions. Among all, more studies analyzing negotiations with nonadditive production functions and repeated production-bargaining relationships with richer strategy spaces are needed.

Many joint production processes involve complementarities. More generally, involved parties' efforts enter into production function in a nonadditive way. Which fairness ideal people would use and how it would influence the bargaining process in such relationships is far from obvious. For instance, the proportionality principle may be less attractive in the presence of complementarities, and marginal contributions may be difficult to calculate in some cases.

The length of the relationship (e.g., short-term vs. long-term) may also influence the fairness judgments and hence the bargaining. Long-term relationships may help agents in forming ties with their bargaining partners and lead to more egalitarian fairness judgments and milder negotiations, whereas short-term relationships may witness equity-based behavior and tougher bargaining. Nevertheless, endogenous group formation and the nature of self-serving biases in repeated production-bargaining relationships need to be studied in more detail.

Most of the studies in the bargaining literature focus exclusively on agreements and use simple, yet useful bargaining models to study agreements. Despite the great importance of agreements, bargaining activity has other potentially important layers such as opening proposals (found to be strongly correlated with terms of agreements), concessions (relevant to the likelihood of an agreement), duration (important for efficiency-based concerns), last-minute agreements (important for negotiation protocol design), and communication (important for understanding the nature of bargaining and reasoning behind agents' behavior). To study these layers, more realistic (and potentially more complicated) bargaining models with larger strategy spaces are needed. Therefore, enriching the strategy space in bargaining experiments by allowing free-form negotiation and communication appears to be a promising step forward.

In an era of team production in organizations, of economic fluctuations and crises that cause changes in the size of the economic pie, sharing the pie is a potentially troublesome issue, making bargaining with joint production an important and fruitful area of study.

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Table 24.1 Fairness Ideals and Responsibility Sets

	Responsibility Set
Strict Egalitarianism	-
Choice Egalitarianism	q
Meritocratism	a, q
Libertarianism	a, q, p

Table 24.2 Average Fairness Judgments and Agreed Shares

	Inactives Decide	Both Decide	Actives Decide
Actives' Share	2.6	5.7	9.1
Inactives' Fairness	5.3	6.3	6.7
Actives' Fairness	7.2	7.5	8.5

1 Burrows and Loomes (1994) describe Lockean desert as “an entitlement to resources which
have been produced through the person’s expenditure of effort.”

2 Königstein (2000) is the first extensive study of bargaining problems with an advance
production. Due to its length (it is a PhD thesis devoted to bargaining problems with an
advance production), we focus only on Gantner, Güth, and Königstein (2001) here, which is
the fourth chapter of Königstein (2000).

3 Therefore, in Gantner et alia terms, the joint production function is $r = 2q_l + 4q_h$.

4 The authors report results from different subject pools such as first-year, second-year, and
fourth-year students and alumni. We report their general findings over the whole subject
pool here.

5 Note that nonnegligible number of the studies we mention are dictator experiments. The
dictator game is closer to being a distribution game rather than a bargaining game.
Nevertheless, behavior in dictator games and ultimatum games are not totally unrelated (see
Forsythe, Horowitz, Savin, and Sefton, 1994).