



***– To Choose or Not to Choose –
Contracts, Reference Points, Reciprocity, and
Signaling***

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Hart and Moore (2008) – Contracts as Reference Points

- Contract design has behavioral implications
 - Impact on parties' subjective entitlements with regard to contract enforcement
 - Flexible contract terms induce conflicting entitlements
 - This may lead to **disappointment** and feelings of aggrievement
 - Feeling aggrieved may induce the desire for **reciprocal actions**
 - Punishments are a waste of resources and a source of **inefficiency**
 - Rigid contract terms avoid such conflicts
- Trade-off between contractual flexibility and rigidity
 - **Flexible** contracts – e.g. range of prices $[p_L, p_H]$
 - Feasible **adaptation** to new circumstances
 - **Conflicting entitlements** → inefficient punishments
 - **Rigid** contracts – e.g. fixed price \hat{p}
 - **Hindrance of adaptation** to new circumstances
 - **fixed entitlements** → no conflict of subjective feelings of entitlements

Experimental Design in a Nutshell

Stages of the experimental game (endogenous contract treatment; 15 periods)

- Stage 1: Buyers determine the contract types (flexible or rigid)
- Stage 2: Contracts are auctioned off to the sellers
- Stage 3: State of nature is determined (good state vs. bad state)
- Stage 4: Adaptation of contract terms (here: price)
(only in case of flexible contracts)
- Stage 5: Seller chooses what quality to deliver
(only in case of flexible contracts or in case of rigid contracts and a good state)
- Stage 6: Payoffs are disclosed to the participants

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- **Stage 6: Payoffs are disclosed to the participants**

	Good State	Bad State (flex)	Bad State (rigid)
Normal quality	$\pi_B = 140 - p$ $\pi_S = p - 20$	$\pi_B = 140 - p$ $\pi_S = p - 80$	$\pi_B = \pi_S = 10$
Low quality (shading)	$\pi_B = 100 - p$ $\pi_S = p - 25$	$\pi_B = 100 - p$ $\pi_S = p - 85$	$\pi_B = \pi_S = 10$

Payoffs are identical to those in FHZ

(Subgame perfect) Nash Equilibrium

Nash Equilibrium

- Stage 5: Since shading incurs an additional cost, sellers never shade.
- Stage 4: Since sellers never shade, buyers need (and do) not increase contract prices voluntarily
- Stage 2: The competitive auction leads to competitive prices for both types of contracts

$$p_{\text{auction}} = 35$$

- Stage 1: Since choosing rigid contracts only incurs an additional cost (in bad states there will be no transaction), **buyers always choose flexible contracts**

FHZ hypotheses

- Flexible contracts induce incompatible subjective entitlements and lead to shading
- Choosing **rigid contracts** defines clear-cut entitlements and **avoids shading**
- Since shading is very costly to **buyers**, many of them **may prefer** to choose **rigid contracts**.

First Experimental Results

- Fehr, Hart, and Zehnder (2010): Contracts as Reference Points – Experimental Evidence
 - Equal distribution of contract types
 - 50 % rigid and 50 % flexible contracts
 - Strong reference points effects
 - 6 % shading in rigid contracts (price = 40.7)
 - 25 % shading in flexible contracts (price = 51.1)
- Conclusion: FHZ seem to confirm Hart & Moore
- Reference point effects invalidate fairness considerations!
- “[...] ex ante competition legitimizes the terms of the contract, and **aggrievement** occurs **mainly** about outcomes **within the contract** and **not about the contract itself**.” (FHZ (2010), p. 6)
- Our starting point: This interpretation seemed to be implausible to us!
 - Something of high importance seems to be missing in FHZ’s interpretation of the data.
 - Our guess was: Buyers may interpret the choice of rigid contracts as an unfair action.

Exogenous Contract Treatment

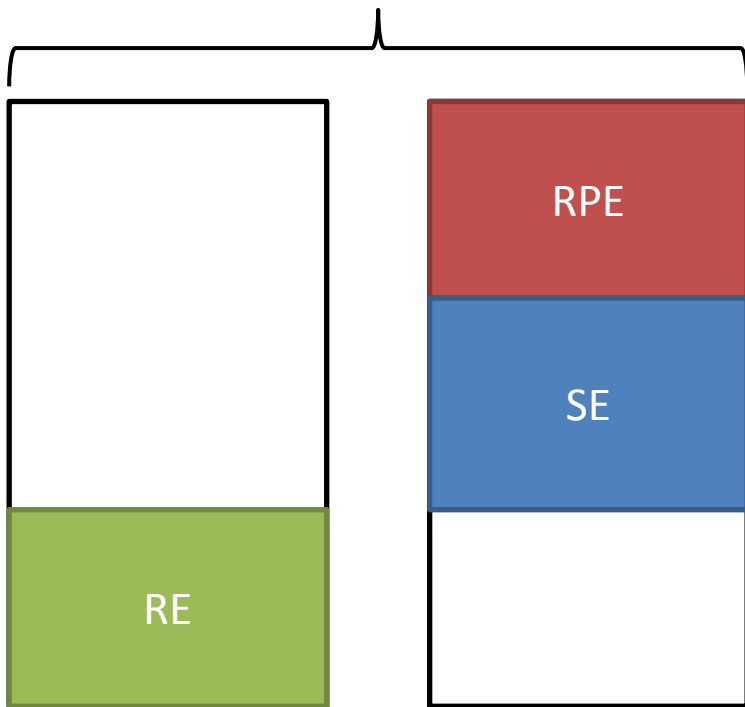
Stages of the experimental game (exogenous contract treatment; 15 periods)

- **Stage 1: Contract types (flexible or rigid) are determined by a chance move**
- Stage 2: Contracts are auctioned off
- Stage 3: State of nature is determined
- Stage 4 (only in case of flexible contracts): Adaptation of contract terms (here: price)
- Stage 5: Seller chooses what quality to deliver
- Stage 6: Payoffs are disclosed to the participants

- Erlei/Reinhold hypotheses:
 - **Exogenously** determined contract types should lead to a decrease in shading under rigid contracts (**lack of negative reciprocity**)
 - Since **choosing a flexible contract** may be interpreted as a **signal** for fair behavior, **sellers' aspiration levels** for fair behavior increase
 - Consequence: Shading under endogenously determined flexible contracts will be higher than under exogenously determined flexible contracts

Theoretical Effects on Shading

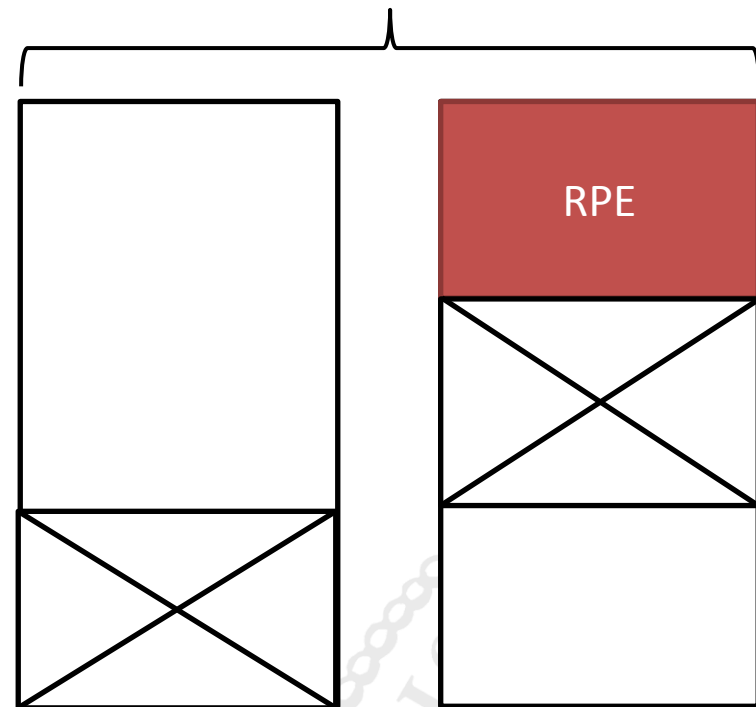
Endogenous Contracts



Rigid contracts

Flexible contracts

Exogenous Contracts



Rigid contracts

Flexible contracts

RE - Reciprocity

SE - Signaling

RPE - Reference points

Procedures

- 20 subjects (10 buyer and 10 seller) per session
- 5 interactions groups of 2 buyers and 2 sellers each
 - Random re-matching in every of the 15 periods
 - Players kept their roles
- Subject pool
 - Students of Clausthal University of Technology
- Sessions (in December 2008)
 - 2 sessions endogenous contracts (“Baseline”)
 - 2 sessions exogenous contracts (step 2 was replaced by a random device)
- Payoffs:
 - Exchange rate: 1:45
 - About 18.28 EUR for one and a half hour
- Conducted with z-tree (Fischbacher 2007)

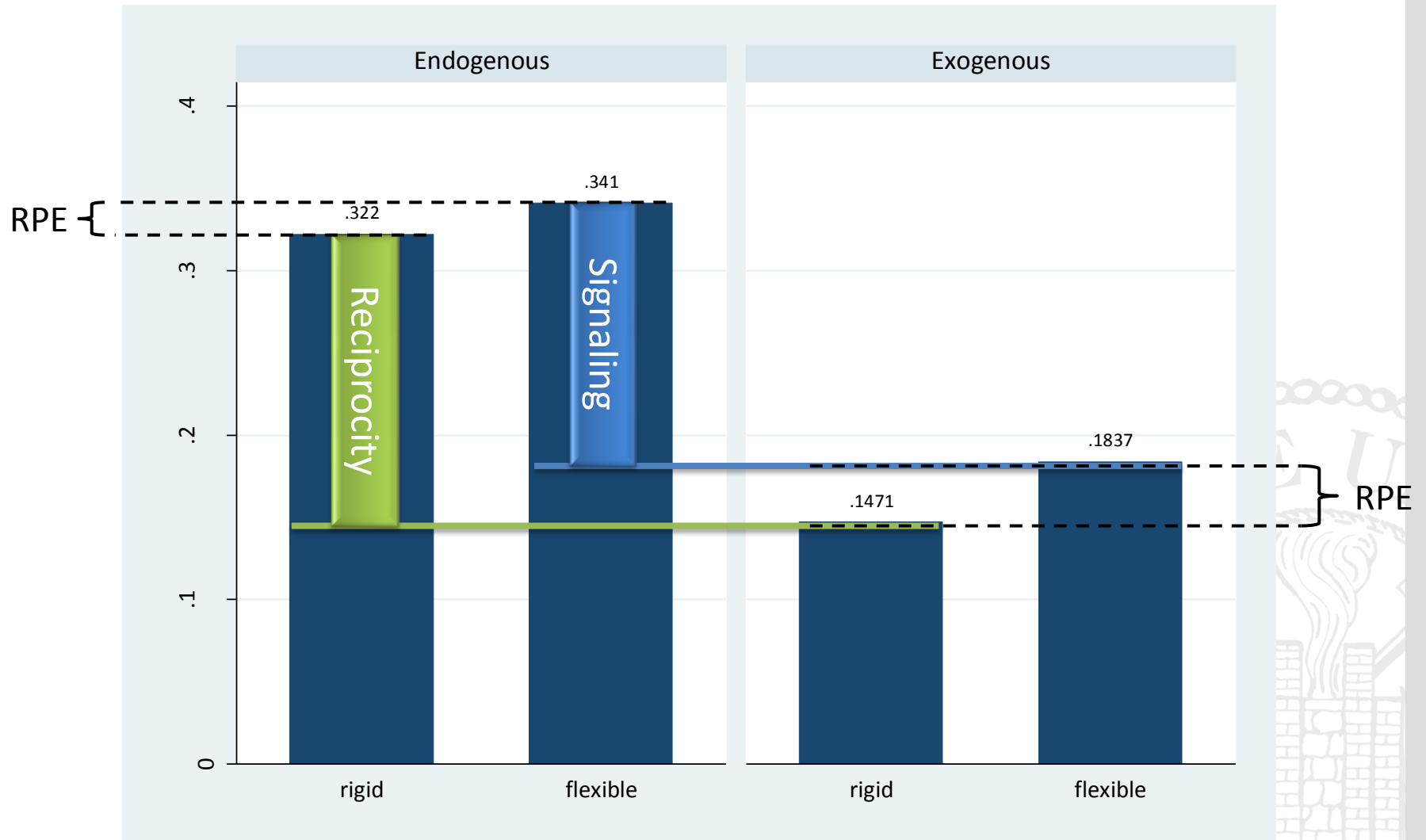
Results

- Result 1 (Contract Choice):
 - Buyers choose rather flexible than rigid contracts
 - **2/3 of all contracts are flexible**
- Result 2 (Auction Price):
 - Prices converge to the competitive equilibrium $p_A = 35$
 - Prices for flexible contracts are lower than those for rigid contracts
- Result 3 (Price Increment):
 - Price increments are above zero and do not differ between the treatments
- Result 4 (Shading):
 - Endogenous treatment: **more shading under rigid contracts** than FHZ
 - Exogenous treatment: **overall less shading** than in the endogenous treatment

Aggregated Results

Treatment	Endogenous Contracts		Exogenous Contracts	
Contract Type	Rigid	Flexible	Rigid	Flexible
Contract Frequency	.277	.723	.484	.516
Auction Price	38.69	37.41	38.44	37.03
Final Price	38.69	47.57 / 97.80	38.44	48.38 / 98.87
Price Increment (good st. / bad st.)	—	10.04 / 2.80	—	11.12 / 3.87
Shading (Shading FHZ)	.322 (.06)	.326 (.25)	.147 (--)	.222 (--)

Shading



Logit-Random-Effects-Regression (Dependent Variable: Shading)

Variable	Model (1)	Model (2)	Model (3)	Model (4)
Flexible Contract (Reference Points)	.819** (.031)	.767** (.039)	.744** (.047)	.642* (.067)
Endo*Rigid (Reciprocity)	1.11** (.046)	1.113** (.044)	1.122** (.044)	1.127** (.043)
Endo*Flexible (Signaling)	1.24** (.015)	1.232** (.016)	1.220** (.017)	1.191** (.019)
Price Increment	-.081*** (.000)	-.059*** (.001)	-.060*** (.003)	-.051*** (.005)
Good State	.630** (.024)	—	.330 (.188)	—
Profit Difference	—	.010** (.035)	—	—
Inequality Aversion	—	—	.899* (.064)	1.157** (.012)
Constant	-2.86*** (.000)	-3.052*** (.000)	-3.47*** (.000)	-3.399*** (.000)
N	525	525	525	525
LL	-249.3	-249.7	-248.1	-248.5
R², ps	.110	.109	.111	.110

Conclusion

- Our research confirms the existence of reference points effects.
- Reference point effects are of smaller magnitude than in FHZ.
- Feeling aggrieved occurs with regard to prices within the contract **and** with regard to the contract itself.
- Ex post fairness considerations are not eliminated by ex ante competition.
- We find evidence for reference point effects, signaling effects, and reciprocity
 - Reference point effect is estimated to be smaller than the signaling effect and the reciprocity effect

Thank you for your attention!

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Agenda

1. The Basic Model of Hart and Moore (2008)
2. Experimental Design
3. First Experimental Results by Fehr, Hart, and Zehnder (2010)
4. Experimental Results
5. Conclusion

Experimental Design in a Nutshell

Stages of the experimental game (endogenous contract treatment; 15 periods)

- **Stage 1: Buyers determine the contract types (flexible or rigid)**
 - **Two buyers each have one contract**
 - **They simultaneously determine their type of contract (flexible or rigid)**
 - **flexible contracts: prices may be changed in stage 4**
 - **rigid contracts: prices cannot be changed in stage 4**
- Stage 2: Contracts are auctioned off
- Stage 3: State of nature is determined
- Stage 4 (only in case of flexible contracts): Adaptation of contract terms (here: price)
- Stage 5: Seller chooses what quality to deliver
- Stage 6: Payoffs are disclosed to the participants

Experimental Design in a Nutshell

Stages of the experimental game (endogenous contract treatment; 15 periods)

- Stage 1: Buyers determine the contract types (flexible or rigid)
- **Stage 2: Contracts are auctioned off**
 - Both sellers can bid for each contract
 - Both buyers' contracts are auctioned off simultaneously (!)
 - Clock auction
 - First price: 35
 - Each second the price increases by 1 until one of the sellers accepts
- Stage 3: State of nature is determined
- Stage 4 (only in case of flexible contracts): Adaptation of contract terms (here: price)
- Stage 5: Seller chooses what quality to deliver
- Stage 6: Payoffs are disclosed to the participants

Experimental Design in a Nutshell

■ Stages of the experimental game (endogenous contract treatment; 15 periods)

- Stage 1: Buyers determine the contract types (flexible or rigid)
- Stage 2: Contracts are auctioned off
- **Stage 3: State of nature is determined**
 - **Good State: Sellers' costs are 20 (probability of good state: 80 percent)**
 - **Bad State (probability: 20 percent):**
 - **Sellers' costs are 80**
 - **Rigid contracts: game ends**
 - **$\pi_i = 10$ (outside option as in FHZ)**
- Stage 4 (only in case of flexible contracts): Adaptation of contract terms (here: price)
- Stage 5: Seller chooses what quality to deliver
- Stage 6: Payoffs are disclosed to the participants

Experimental Design in a Nutshell

■ Stages of the experimental game (endogenous contract treatment; 15 periods)

- Stage 1: Buyers determine the contract types (flexible or rigid)
- Stage 2: Contracts are auctioned off
- Stage 3: State of nature is determined
- **Stage 4 (only in case of flexible contracts): Adaptation of contract terms (here: price)**
 - **Good State: buyers choose a price within the interval $p_{\text{auction}} \leq p \leq 140$.**
 - **Bad State: buyers choose a price in the interval $95 \leq p \leq 140$.**
- Stage 5: Seller chooses what quality to deliver
- Stage 6: Payoffs are disclosed to the participants

Experimental Design in a Nutshell

Stages of the experimental game (endogenous contract treatment; 15 periods)

- Stage 1: Buyers determine the contract types (flexible or rigid)
- Stage 2: Contracts are auctioned off
- Stage 3: State of nature is determined
- Stage 4 (only in case of flexible contracts): Adaptation of contract terms (here: price)
- **Stage 5: Seller chooses what quality to deliver**
 - **Normal quality:**
 - **Sellers have to bear the standard costs**
 - **Buyers value the output at 140**
 - **Low quality (shading):**
 - **Sellers' costs increase by additional 5 units.**
 - **Buyers value the output at only 100**
- Stage 6: Payoffs are disclosed to the participants

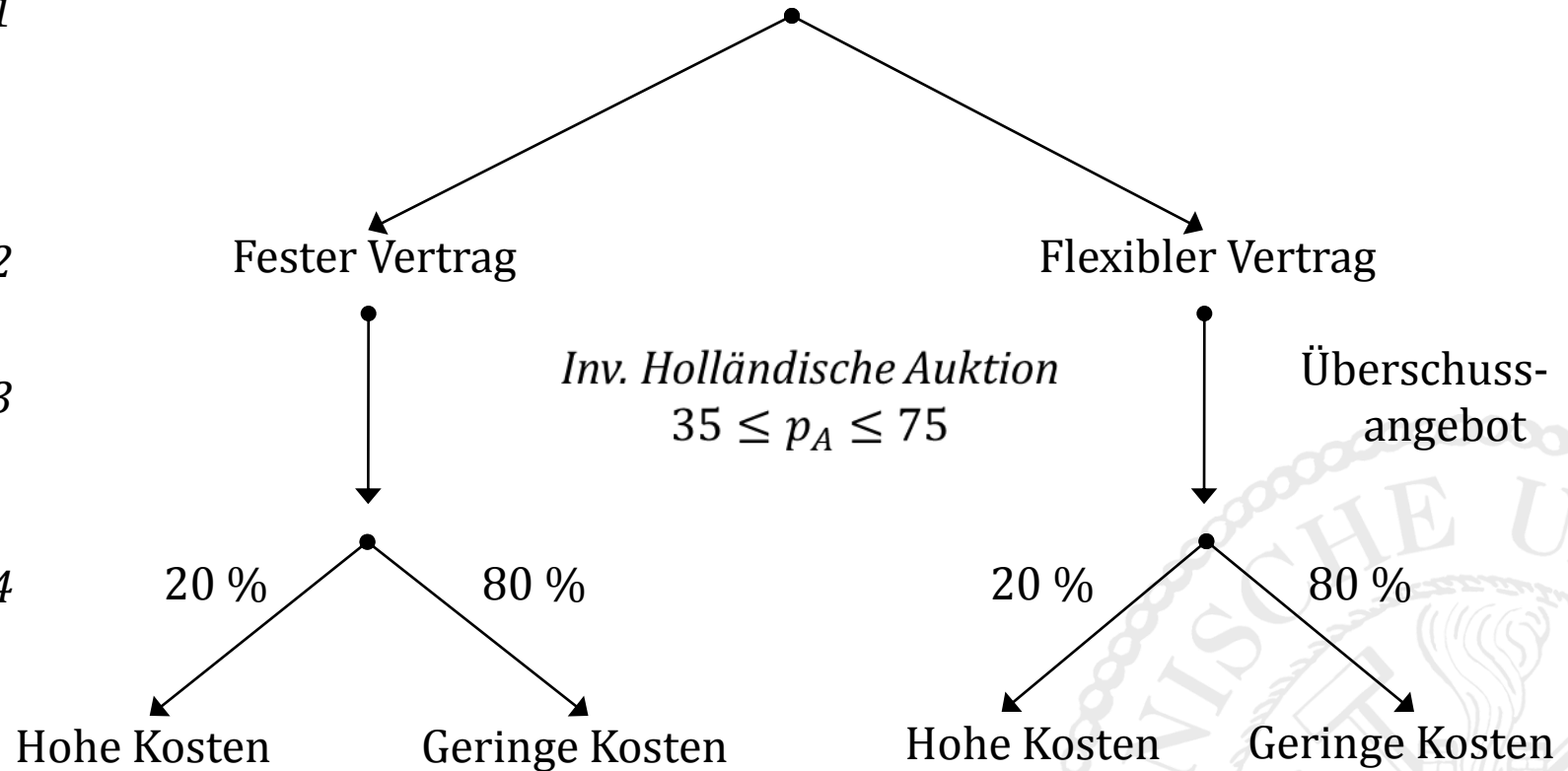
Experimentdesign – Ex ante-Vertragsphase

Stufe 1

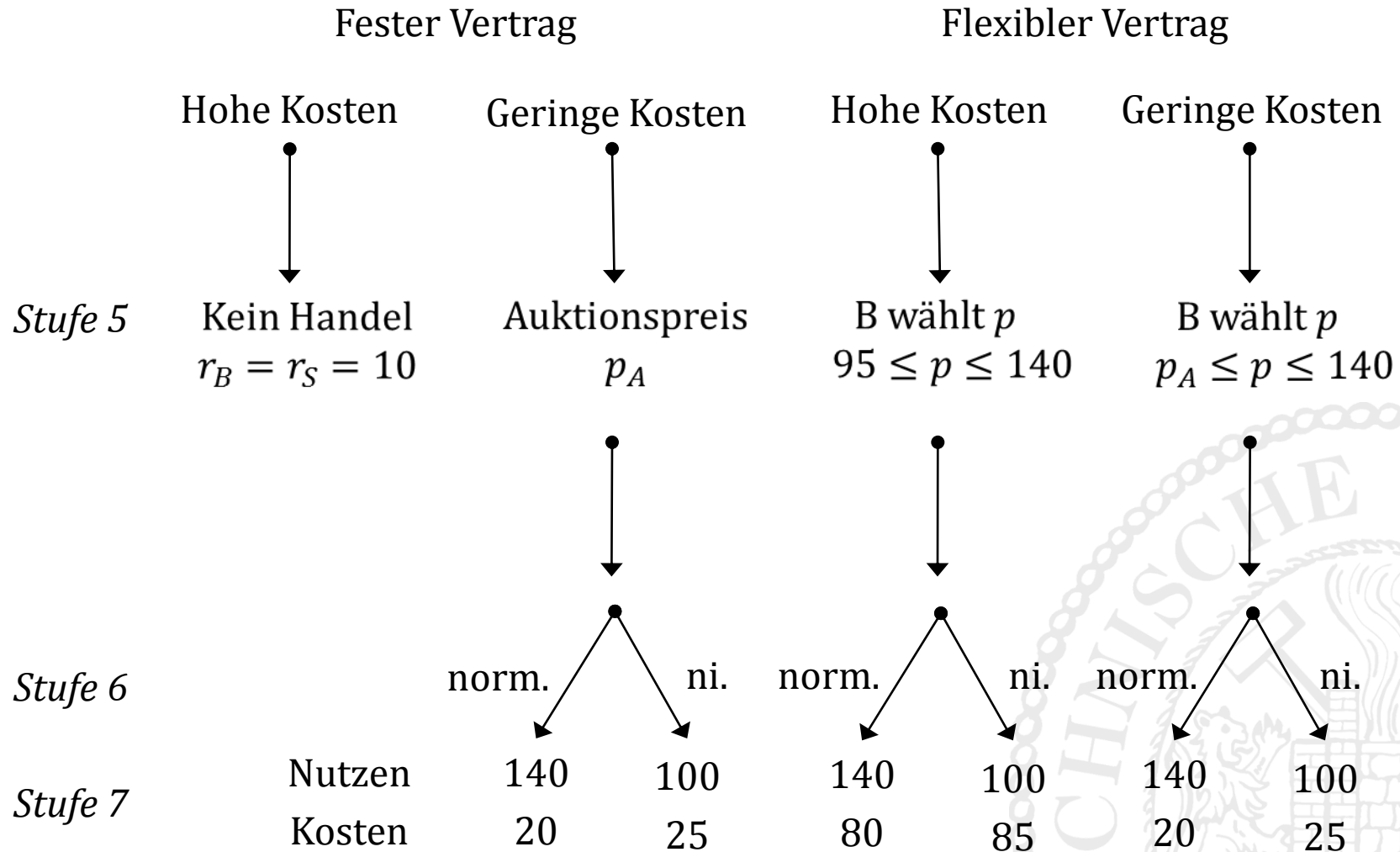
Stufe 2

Stufe 3

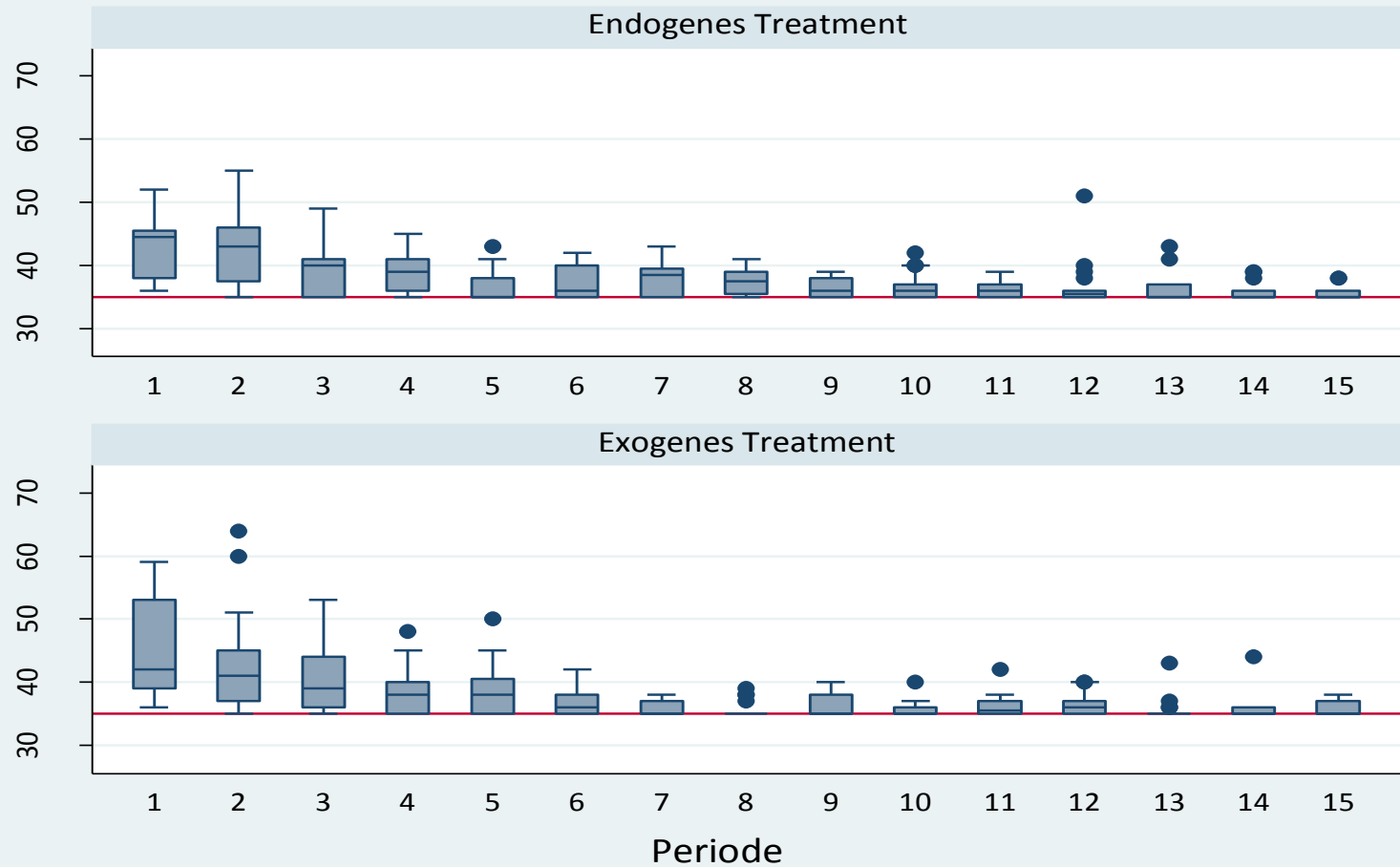
Stufe 4



Experimentdesign – Ex post-Handelsphase



Entwicklung der Auktionspreise



Screenshot - Stufe 3

Periode		1 von 1		Verbleibende Zeit [sec]: 37	
Versteigerung der angebotenen Verträge unter den Verkäufern					
Auf dieser Seite findet die Auktion des Vertrages des ersten Käufers in Ihrer Gruppe statt!			Auf dieser Seite findet die Auktion des Vertrages des zweiten Käufers in Ihrer Gruppe statt!		
Vertragsart: fester Vertrag			Vertragsart: fester Vertrag		
Preis:			Preis:		
39			39		
					
Vertrag annehmen			Vertrag annehmen		