CFR-Working Paper NO. 06-13

How do self-fulfilling prophecies affect financial ratings? - An experimental study

S. Celjo-Hörhager • A. Niessen

centre for financial research
Look deeper

How do Self-fulfilling Prophecies affect Financial Ratings?
- An experimental study -

Sanela Čeljo-Hörhager and Alexandra Niessen*

Abstract

In this experimental study we examine the impact of self-fulfilling prophecies on financial ratings. According to theoretical models like Kuhner (2001), rating agencies are more likely to reveal their private information if their rating can not become self-fulfilling from an ex-post point of view. In our experiment we use two settings in which ratings differ with respect to the degree of their self-fulfilling impact. In connection with a strong self-fulfilling impact of ratings we indeed observe that agencies are more likely to assign ratings which are not in line with their private information. Our results support theoretical findings of Kuhner (2001). However, the pathological equilibrium predicted by the theoretical model does not emerge in our experiment.

JEL-Classification Codes: D82, F34, G23

Keywords: Self-fulfilling Prophecies, Financial Ratings, Asymmetric Information

* The authors thank Ben Greiner, Jens Großer, Dieter Hess, Christoph Kuhner, Axel Ockenfels, Stefan Ruenzi and seminar participants at the University of Cologne for helpful comments and suggestions. Čeljo-Hörhager: University of Cologne, Graduate School of Riskmanagement, Albertus Magnus Platz, 50923 Cologne, Tel.: +49-(0)221-4706334, Email: celjo@wiso.uni-koeln.de. Niessen: University of Cologne, Department of Corporate Finance and Centre for Financial Research, Albertus Magnus Platz, 50923 Cologne, Tel.: +49-(0)221-4707878, Email: niessen@wiso.uni-koeln.de

1. Introduction

The importance of financial ratings on the capital market has dramatically increased during the past years. To overcome information asymmetries and enhance market efficiency, financial intermediaries like rating agencies are used to evaluate and process important information on capital markets.

We conduct the first experimental study to investigate how self-fulfilling prophecies affect the willingness of a rating agency to assign ratings which corresopond to her private information on her client's creditworthiness. Since there are no legal mechanisms to control the quality of credit ratings, the informational value of rating agencies' evaluations depends entirely on their efforts to build up and maintain a good reputation. However, the ambition to maintain a good reputation can not guarantee the correctness of ratings. The self-fulfilling impact of financial ratings disturbs the incentive to reveal private information in such a way that it might be of agencies' interest to misrepresent their clients quality. How self-fulfilling properties of ratings affect the credibility of financial ratings is therefore our main research question.

The phenomenon of a self-fulfilling prophecy with respect to financial intermediaries has first been theoretically described by Diamond und Dybvig (1983). They model bank runs as one of two self-fulfilling equilibria. The bank run equilibrium emerges as a result of a shift in the self-fulfilling expectations of depositors. The model can be generalized to liquidity crises, when creditors do not roll over a credit to a solvent company or to bank- and currency crises as well as stock market crashs that have often been influenced by analysts' forecasts and ratings.

The empirical research of self-fulfilling prophecies and their effects on capital markets meets the problem that self-fullfilling prophecies create their own reality. Since the self-fulfilling forecast causes its own fulfillment, it is ex-post impossible to determine if the forecast was ex-ante correct or if it only became true as a result of a self-fulfilling prophecy. The collection of empirical data is therefore complicated. For this reason, experimental studies are crucial for the research of self-fulfilling prophecies. An experimental study by Madiès (2003) confirms the possibility of self-fulfilling panic bank runs in the sense of Diamod and Dybvig (1983). The study provides support for the theory that bank runs can emerge as a result of coordination failure. Furthermore, Brañas-Garza, Fatas and Guillen (2006) explore experimentally how a self-fulfilling prophecy can solve a social dilemma as a voluntary contribution to a public good.

Most theoretical work on rating agencies has focused on the development of markets for information and the role of financial ratings on capital markets. Boot, Milbourn and Schmeits (2003) suggest that rating agencies act as a coordination mechanism in situations with multiple equilibria by showing that credit ratings serve as a "focal point". Carlson and Hale (2006) analyze a global game model in order to investigate the influence of credit ratings on financial markets. They find that the introduction of a rating agency may bring multiple equilibria to a market that would otherwise have a unique equilibrium.
Like several other financial intermediaries, rating agencies can initiate the process of a self-fulfilling prophecy by their news releases. The self-fulfilling impact of their ratings makes the identification of potential agency errors ex-post almost impossible. The ability of rating agencies to induce self-fulfilling prophecies might thus have a negative influence on the quality of their ratings. Under those circumstances the credibility of ratings has to be questioned, which has very important implications for capital markets.

The relationship between self-fulfilling prophecies and rating agencies has been investigated in a game theoretical model by Kuhner (2001). This model provides the basis of our experiment. Kuhner (2001) suggests that rating agencies have incentives to assign incorrect ratings when self-fulfilling prophecies are prevalent. In his model, a rating agency possesses private information about the quality of a debtor. Depending on the degree of self-fulfilling prophecies the agency assigns a rating that either corresponds to the private information or is incorrect. A creditor then decides based on the rating whether to prolongate or withdraw the credit he gave to the debtor. By aggregating the behavior of creditors to one bayesian player, i.e. the representative creditor, Kuhner (2001) explicitly assumes rational herding behavior.
In the basic model neither fundamentally healthy nor unhealthy debtors can survive a creditor´s exit. According to this assumption, an agency's recommendation to withdraw[1] always seems to be correct from an ex post point of view, given that the creditor withdraws the credit in accordance with the agency's rating. Thus, the agency's recommendation of withdrawal is self-fulfilling. The optimal strategy of the rating agency is therefore to recommend withdrawal, when she anticipates a creditor who follows her recommendation. This leads to bankruptcy of the rated debtor. This leads to only one equilibrium in the basic model, i.e. the pathological equilibrium. The extension of the model enables debtors of

[1] In the original model by Kuhner (2001) the agency can assign an investment grade or a speculative grade rating. In our experiment the recommendation to invest is the equivalent to an investment grade rating, whereas we interpret the assignment of a speculative grade rating as a recommendation to withdraw.

good quality to survive a withdrawal decision with a positive probability. Thus, the self-fulfilling impact of ratings gets weaker which leads to multiple equilibria. In addition to the pathological equilibrium there also exists a separating equilibrium, in which the rating agency reveals her private information and creditors obtain an informative rating they can use for their investment decisions.

We design our experiment according to these frameworks developed in Kuhner (2001). Our first setting corresponds to the basic model with a strong self-fulfilling impact of ratings and our second setting is based on the extended model where the self-fulfilling impact of ratings is weaker. Thereby we can explore the impact of self-fulfilling prophecies on the credibility of rating agencies' recommendations. Findings from our experiment suggest that self-fulfilling prophecies are indeed negatively related to the credibility of a rating agency. A strong self-fulfilling impact of ratings lowers the willingness of rating agencies to reveal their private information and vice versa. However, we do not observe the pathological equilibrium as predicted by the theoretical model. Inspite of the strong self-fulfilling impact of their ratings, a significant number of rating agencies still remains cooperative and reveals their private information. Although this behavior prevented the total break down of information brokering in the basic model, rating agencies' credibility is significantly lower in our first setting than in the second one. For the most part, our findings provide experimental support for the model of Kuhner (2001) suggesting that self-fulfilling prophecies have an adverse effect on the credibility of ratings, an issue that is especially important in systemic crises.

The paper proceeds as follows. In Section 2 we briefly discuss the theoretical framework developed by Kuhner (2001) which is the basis for our experimental design. We then describe the experimental design in Section 3. Section 4 contains the results of our experimental study and Section 5 concludes.

2. Theory of self-fulfilling prophecies

The game theoretical model of Kuhner (2001) investigates if rating agencies reveal their private information on the creditworthiness of their clients when self-fulfilling prophecies are prevalent. This model provides the theoretical background for our experiment. Depending on the parameter values chosen within the model, different strategies and equilibria emerge.[2] Our experimental design relies on two specific frameworks of Kuhner

[2] For a further discussion of the equilibria in the general model see Kuhner (2001).

(2001) which we present in this section. Note that in comparison to the general model of Kuhner (2001), our version only differs by chosing two frameworks with certain parameter values that we hold fixed.[3] The parameter values are chosen in a way that we obtain different game theoretical solutions, depending on the intensity of ratings' self-fulfilling impact. Thus, the theoretical solution implies that the communication of rating agencies is impaired by a strong self-fulfilling impact of their ratings. In our first setting, which relies on the basic model (strong self-fulfilling impact of ratings), only a pathological equilibrium emerges, whereas the extended model (weak self-fulfilling impact of ratings) additionally contains a separating equilibrium.

2.1 The basic model of Kuhner (2001)

The basic model with a strong self-fulfilling impact of ratings is a two players game, where a rating agency and a creditor interact. Both players are concerned with the creditworthiness of a debtor who can be of good (G) or bad (nG) quality.

The probability to observe a debtor of good quality is equal to[4]

$$(1) \qquad p = P(G) = 0.6,$$

whereas the debtor is of bad quality with probability

$$(2) \qquad P(nG) = 1 - p = 0.4.$$

A debtor of good quality will persist, if the creditor further invests (I) his funds,

$$(3) \quad P(\text{Bankruptcy} \mid G \text{ and } I) = 0,$$

and will go bankrupt if the creditor withdraws (nI) his funds,

$$(4) \quad P(\text{Bankruptcy} \mid G \text{ and } nI) = 1.$$

If the debtor is of bad quality, he will always go bankrupt,

$$(5) \quad P(\text{Bankruptcy} \mid nG) = 1,$$

regardless of the creditor's decision.

The rating agency exclusively observes a signal (S), which imperfectly reveals the debtor`s quality. The precision of the signal is characterized by

$$(6) \quad q = P(S \mid G) = 0.8 \quad \text{and} \quad 1 - q = P(S \mid nG) = 0.2.$$

[3] For our experimental setting we take the same parameter values as used in Kuhner (2001) to make our results directly comparable to the theoretical model. For a further discussion of these values see Kuhner (2001).

[4] The following parameters are taken from Kuhner (2001).

The rating agency evaluates the credit quality of the debtor based on this information and advises the creditor to further invest (I) or to withdraw (nI) his funds. The creditor then decides based on the advice given by the rating agency. The costs for the creditor are greater if he further invests and the debtor goes bankrupt than the costs of withdrawal. The payoff structure of the representative creditor is summarized in Table 1.

Outcome	**Payoff**
Debtor survives	A = 1000
Debtor breaks down after withdrawal (nI)	B = 650
Debtor breaks down after investment (I)	0

Table 1: Creditor´s Payoff

The payoffs of the rating agency represent reputational gains and losses, depending on whether the rating is ex post observed as "correct" or "incorrect" by the creditor. A "correct" rating, i.e. the survival of the debtor after the advise to invest and the break down of the debtor after the advise to withdraw, will maintain the agency´s reputation. The reputational loss is largest, if a debtor breaks down after the agency advised the creditor to invest. The payoff structure of the rating agency is specified in Table 2.[5]

Outcome	**Payoff**
Advice to invest & debtor survives or Advice "Withdraw" & debtor breaks down	0
Advice to withdraw & debtor survives	E = -600
Advice to invest & debtor breaks down	F = -1000

Table 2: Agency´s Payoff

The decisions of the rating agency and the creditor are made sequentially. The chronological sequence of their decisions is illustrated in Table 3:

Event	**Description**
Step 1: Quality of the debtor	Credit quality *p* of the debtor is determined.
Step 2: Signal	Agency observes signal on credit quality *p* with precision *q*.
Step 3: Rating	Agency discloses rating: Invest (I) or withdraw (nI)
Step 4: Decision of creditor	Creditor observes rating and decides to withdraw or not to withdraw.

[5] For a further discussion of the assumed ranking of payoffs, see Kuhner (2001).

Step 5: Outcome for debtor	Basic Model: If creditor withdraws, all debtors will go bankrupt. If creditor invests, debtors will survive with probability *p*.
	Extended Model: If creditor withdraws, debtors of good quality survive with probability *r*. If creditor invests, debtors will survive with probability *p*.

Table 3: Sequential decisions of rating agency and creditor

The theoretical solution of this model leads to a unique pathological equilibrium. If ratings have strong self-fulfilling properties, the agency will always recommend withdrawal, regardless of her private information on the debtor's quality. Under those circumstances, creditors ignore the agency's recommendation since they anticipate the impairment of agency's incentives. Nevertheless, the creditor maximizes his payoff by withdrawing his funds in this case. Since creditor's withdrawal forces every into bankruptcy, the agency has the incentive to recommend withdrawal as soon as she anticipates compliant creditor's behavior. Due to their self-fulilling properties, "withdrawal" recommendations will ex-post always seem correct. Thus, a pathological equilibrium is the only equilibrium that emerges as a result of the strong self-fulfilling impact of "withdrawal" ratings.

2.2 The extended model of Kuhner (2001)

The extension of the model lowers the self-fulfilling impact of ratings and thus affects the incentive structure of the rating agency. In this setting, we still use the same parameter values as in the basic model but enable debtors of good quality to survive the withdrawal of their creditors with a positive probability, $r = 0.4$.[6] A creditor, who follows the agency's "withdrawal" recommendation, does not necessarily cause bankruptcy of his debtor anymore. Therefore, creditors might be capable of recognizing incorrect ratings in the extended model und thus affect rating agency's expected payoff. For this reason, an additional equilibrium emerges in the extended model. Besides the pathological equilibrium, there now exists a separating equilibrium in which the rating agency reveals her private information about the creditworthiness of the debtor.

To test the implications provided by the theoretical model in experimentally, we develop two settings according to the two frameworks of Kuhner (2001). Our first setting is based on the basic model characterized by a strong self-fulfilling impact of ratings (see Section 2.1). The second setting corresponds to the extended model with a weaker self-fulfilling impact of agency's recommendations. Thus, according to the theoretical predictions of

[6] For a discussion of the parameter values, please refer to Kuhner (2001).

Kuhner (2001) we expect the first setting to result in a pathological equilibrium whereas we expect the second setting to additionally contain a separating equilibrium.

3. Experimental Design

The experiment was conducted in the Cologne Laboratories for Economic Research at the University of Cologne. The basic model (strong self-fulfilling impact of ratings) as well as the extended model (weak self-fulfilling impact of ratings) were tested in two sessions with 30 periods and 32 participants. In total, we recruited 128 participants from undergraduate classes at the University of Cologne for our experiment. The experiment was programmed and conducted with the software z-Tree (Fischbacher 1999).

To prevent that the behavior of participants in the experiment is biased due to framing effects, we followed the common rules of experimental testing[7] and formulated the decision problem in a neutral framework. Rating agencies were labeled as "participant X" and creditors were labeled as "participant Y". The original creditor's withdrawal decision was redefined as an investment in a "project" of uncertain quality. Participants X and Y were matched randomly for each period to avoid learning caused by a multi-period interaction between participants.[8] Throughout the experiment we ensured anonymity and effective isolation of participants in order to minimize any interpersonal influences that could bias our results.

At the beginning of each session, participants were assigned randomly, to adopt the role of participant X (rating agency) or participant Y (creditor). All participants remained in their role over the whole session. For each period, participants X (rating agency) were randomly matched to participants Y (creditor).

At the beginning of each period, a random number determined the quality of the debtor. Another random number determined if the signal shown to the rating agency indicated a good or bad quality of the debtor. Then, participant X (rating agency) was asked to recommend investment (I) or withdrawal (nI) to participant Y (creditor) by the following screen:[9]

[7] See e.g. Friedman and Sauners (1994).
[8] See Kagel and Roth (1995).
[9] Since the experiment was conducted with German students, the language on the screen was German.

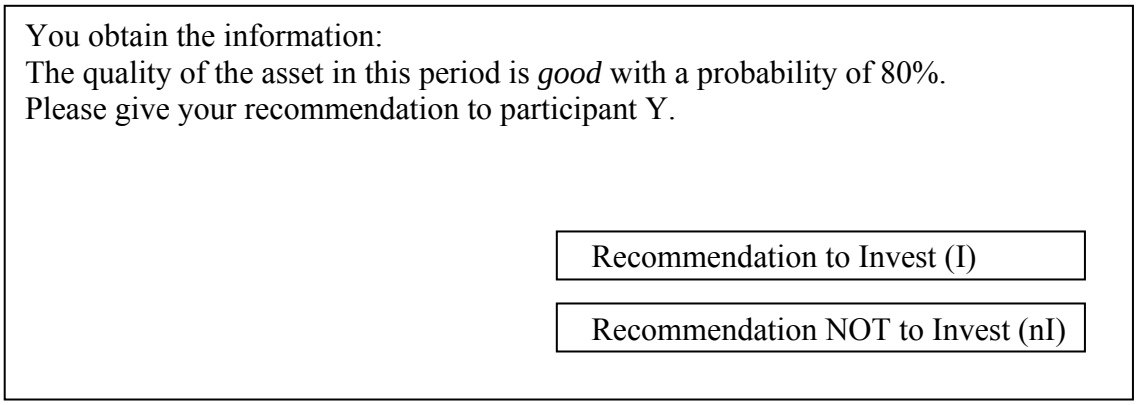


Figure 2: Screen shown to participants X (rating agency) within the experiment.

Subsequent to the agency's recommendation, the creditor was asked to make his decision by the following screen:

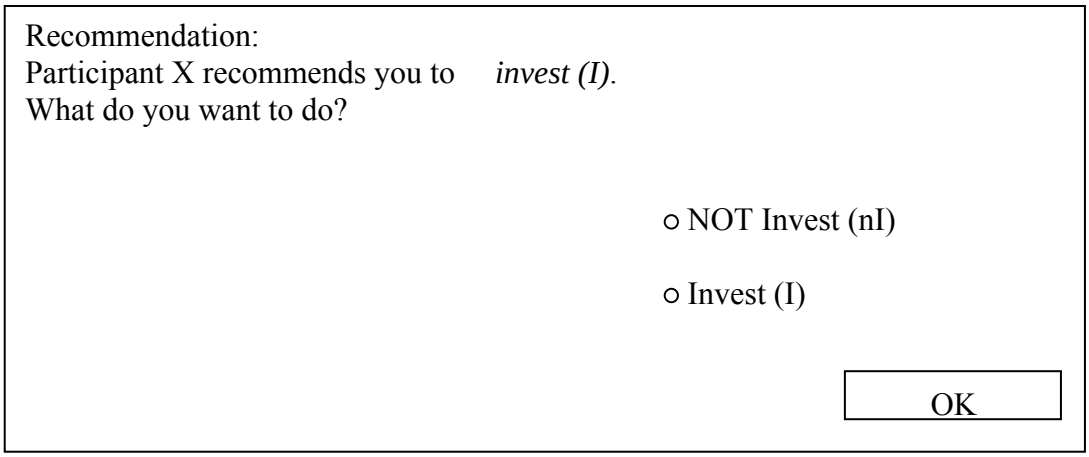


Figure 3: Screen shown to participants Y (creditors) within the experiment.

At the end of each period participants obtained their payoff in experimental units, according to their decision and the solvency of the debtor. At the end of the experiment, experimental units were converted to Euros at a ratio of 100:1. Finally, one of the 30 periods played was randomly selected and participants obtained the payoff they gained in the selected period. By selecting one out of 30 periods we avoid income effects that could otherwise bias our results. Based on the parameter values we implemented from the theoretical model, participants could earn 0,00€, 4,00€, 6,50€ or 10,00€ added to their show-up fee of 2,50€. Both, the show-up fee and earnings gained in the experiment were paid out privately. Participants stayed anonymous for the whole time, they never became aware of whom they were interacting with.

When designing our experiment we tried to obtain as many independent observations as possible. In two-person-games independent observations over more than one period can only be obtained if pairs are matched in a way which ensures that players do not interact with each other more than once. Furthermore, they should never interact with somebody who already was in contact with a participant they had interacted with[10]. Therefore, we assigned participants randomly to a role (rating agency or creditor) and then kept their roles fixed during the whole session. Furthermore, each participant was assigned to a matching group and stayed within this matching group for the whole experiment. We used four matching groups in each session, so that each matching group consisted of 8 participants (4 rating agencies and 4 creditors). At the beginning of each period, pairs were matched randomly within the four matching groups. This procedure ensures that we obtain 16 independent observations per matching group and 64 independent observations each session. Filtering the data of all four sessions for independent observations leads to a total number of 256 independent observations. The following statistical evaluation of our experimental data is solely based on independent observations.

4. Results

In this section we present the results of our experimental study chronologically, i.e. in the order the decisions were made in the experiment. Thus, we first investigate the behavior of the rating agencies depending on whether they observed a signal indicating a debtor of bad or good quality. In the second step, we analyze how creditors behave depending on the recommendation they received from the rating agency.

4.1 Behavior of rating agencies after signal (nS) indicated a debtor of bad quality (nG)

As assumed above, debtors of low quality always go bankrupt independent of the creditor´s investment decision. Therefore and due to a high signal precision of 80% it is the agency's dominant strategy to recommend withdrawal every time she observes a signal indicating a debtor of bad quality. Our empirical findings support this theoretical prediction. After observing a signal (nS) indicating a debtor of bad quality, all rating agencies recommended withdrawal (nI) in setting 1 (strong self-fulfilling impact of ratings). In setting two (weak self-fulfilling impact of ratings), all but one rating agency recommended withdrawal. This is in line with the game theoretical solution. Based on a Fisher-Test we can reject the null hypothesis of equal probability for both recommendations (I and nI) on a 1% significance level. Thus, rating agencies in the basic model as well as in the extended model are

[10] See Davis and Holt (1993).

significantly more likely to recommend withdrawal after observing a signal indicating that the debtor is of low quality. Table 4 summarizes our experimental results.

	Investment (I)	**Withdrawal (nI)**	**Total**
Basic Model	0	15	15
Extended Model	1	14	15

Table 4: Decision of rating agencies after no signal (number of observations)

If we compare the basic model with the extended model, a Fisher-Test reveals no significant differences, i.e. rating agencies of both settings do not differ significantly in their behavior after observing a signal indicating a debtor of bad quality. Independent of acting within the framework of the basic model or the extended model, they are more likely to recommend withdrawal.

4.1 Behavior of rating agencies after signal (S) indicated a debtor of good quality (G)

The observation of a signal that indicates a debtor of good quality leads to different incentives for rating agencies in our two experimental settings. Given a compliant creditor who follows the agency's recommendation, it is the agency's optimal strategy to always recommend withdrawal in the basic model (see Section 2). In the extended model, debtors of good quality can survive a withdrawal with a probability of 40%. Therefore, creditors are able to detect an incorrect recommendation of the rating agency, i.e. a recommendation to withdraw in spite of a debtor of good quality. This leads to the existence of a separating equilibrium (additionally to the pathological equilibrium) where rating agencies always reveal truthfully what kind of signal they have observed. Table 5 summarizes our findings concerning the behavior of rating agencies after observing a signal that indicates a debtor of good quality:

	Investment (I)	**Withdrawal (nI)**	**Total**
Basic Model	58	55	113
Extended Model	90	23	113

Table 5: Decision of rating agencies after signal (number of observations)

In the basic model, 58 rating agencies decide to recommend investing (I) after observing the signal and 55 rating agencies decide to recommend withdrawal (nI). The null hypothesis of equal probability for both ratings (I and nI) can not be rejected on regular significance levels, i.e. no rating can be identified as the preferred one. A pathological

equilibrium as predicted by the theoretical model where rating agencies always recommend withdrawal can not be observed. Unlike the basic model, the extened model reveals a clear preference to recommend investing after a signal indicated a debtor of good quality. 90 rating agencies recommended to invest (I) and 23 rating agencies recommended withdrawal (nI). The null hypothesis that both recommendations are equally probable can be rejected on the 1% significance level. This observation provides evidence for the existence of a separating equilibrium. However, the null hypothesis of the investment recommendation (I) as the only reaction of an agency after observing a good signal can not be rejected. However, since the extendend model also contains a pathological equilibrium this is not contrary to the theoretical findings.

Comparing the two settings we find strong support for the influence of self-fulfilling prophecies on the ratings disclosed by the agencies. After observing a signal indicating a debtor of good quality with a probability of 80%, rating agencies in the extended model recommend to invest in 79,65% of all cases whereas only 51,33% of all rating agencies recommend investing in the basic model. This is also shown in Figure 4:

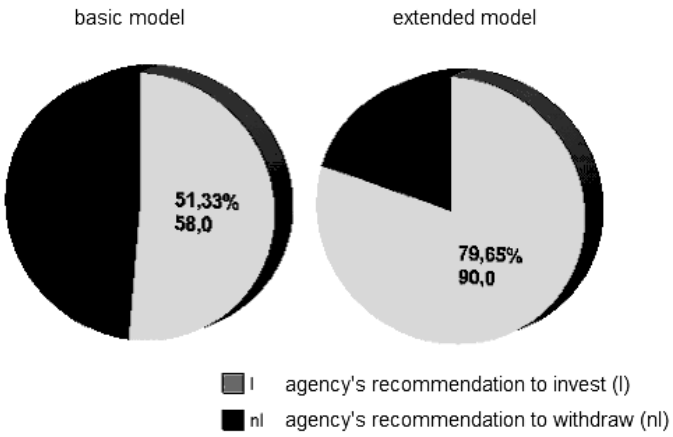


Figure 4: Behavior of rating agencies in both settings after observing the signal

Based on a chi-squared test we reject the null hypothesis of no difference between both settings on a significance level of 1%. Thus, after a signal indicates a debtor of good quality, rating agencies are significantly more likely to recommend investment (I) in the extended model than in the basic model. This is consistent with predictions of the theoretical model. However, the theoretical model results in a pathological equilibrium for the basic setting, a result that is not supported by our experimental findings.

4.3 Behavior of creditors after recommendation to invest (I)

According to Kuhner (2001), we asked creditors to make their decision in the experiment after they received the agency's recommendation. Creditors are aware of the publicly available information that the creditworthiness of the debtor is good with a probability of 60% and that the precision of the agency's private signal is 80%. They also know the payoff structure of the ageny. However, they do not know if the rating agency observed a signal indicating a debtor of good or bad quality.

If a rating agency recommends to invest, creditors in both settings can conclude from this rating that the agency observed a signal indicating a debtor of good quality. In none of the settings the rating agency would have an incentive to recommend investment (I) after observing a signal indicating bad quality of the debtor. Creditors receiving a recommendation to invest can therefore update their belief about the creditworthiness of the debtor and assume that the specific debtor of this period is of good quality. Revised beliefs then can be used to calculate expected payoffs as summarized in Table 6.

	Investment (I)	**Withdrawal (nI)**
Basic Model	800	650
Extended Model	800	762

Table 6: Expected payoff for creditors after an informative recommendation to invest

According to the expected payoffs in Table 6, the optimal strategy of a risk neutral and rational creditor after receiving a recommendation to invest in both settings is to invest. This behavior can also be observed in our experiment as plotted in Figure 5.

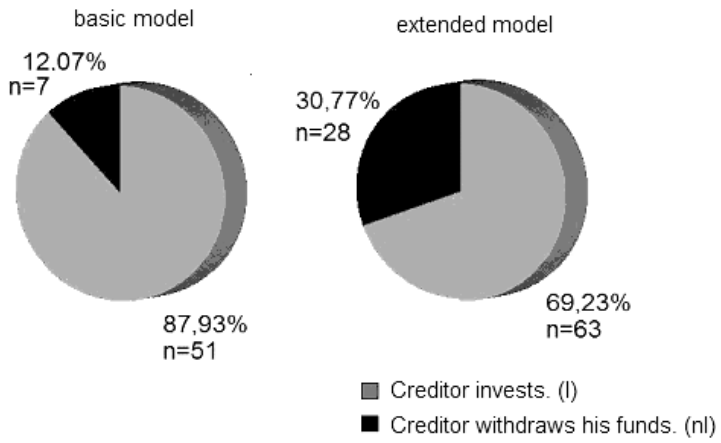


Figure 5: Behavior of creditors after receiving a recommendation to invest

The preferred strategy of creditors after receiving a recommendation to invest is to invest. This finding is valid for the basic as well as the extended model. Interestingly, the result is

stronger for the basic model. Since incentives for rating agencies to falsely recommend withdrawal after observing the signal of good debtor-quality are stronger in the basic model with a large self-fulfilling impact of ratings, the recommendation to invest in this case is even more credible within the basic model. This is also reflected in the results presented in Table 7.

	Investment (I)	**Withdrawal (nI)**	**Total**
Basic Model	51	7	58
Extended Model	63	28	91

Table 7: Decision of creditors after receiving a recommendation to invest

However, the null hypothesis that creditors always decide to invest after receiving a recommendation to do so has to be rejected for both settings. We argue that this is because not every participant of our experiment is risk neutral as assumed in the theoretical model. If a participant is risk averse, they might prefer the assured payoff of 650 experimental units in the basic model as compared to a lottery with expected payoff of 800 experimental units. In the extended model, risk averse participants might prefer a lottery with expected payoff 762 and worst payoff 650 to a lottery with expected payoff 800 and a 20% probability of receiving nothing.

Analyzing both settings separately, the decision to invest after receiving a recommendation to do so is the theoretically preferred action. Therefore, in both settings, creditors tend to follow a recommendation to invest. However, creditors are more willing to follow this recommendation in the basic model. A chi-squared test of no difference between both settings reveals on a 10% significance level that creditors in the basic model are more likely to follow a recommendation to invest. This finding might be due to the fact, that an investment rating is even more credible in the basic model and that creditors have to be less risk averse to act contrary to a recommendation to invest in the extended model as compared to the basic model.

4.4 Behavior of creditors after recommendation to withdraw (nI)

Incentives within the basic model lead to an optimal strategy for rating agencies to always recommend withdrawal even if the signal indicated a debtor of good quality. Therefore, a recommendation to withdraw is not credible in the basic model and creditors can not conclude from this recommendation that the rating agency did observe a signal indicating a debtor of bad quality. The best answer of a creditor after receiving a recommendation not

to invest can be derived from Table 8 containing expected payoffs for creditors after such a recommendation.

		Investment (I)	Withdrawal (nI)
Basic Model	not informative	600	650
Extended Model	informative	200	678
	not informative	600	734

Table 8: Expected Payoff for creditors after recommendation to withdraw (nI)

Expected payoffs for the basic model show that a creditor should decide to withdraw after a recommendation to withdraw (nI). Even if the recommendation itself is not informative, expected payoffs suggest that a withdrawal is of creditor's interest. Thus he unwillingly follows the recommendation to withdraw disclosed by the rating agency.

Within the framework of the extended model, we observe two equilibria. Creditors have to decide whether rating agencies assign an informative rating or not. If the creditor is convinced that the recommendation to withdraw is informative, he can conclude that the rating agency observed a signal indicating a debtor of bad quality. However, if the creditor does not trust the rating agency and thinks that the recommendation to withdraw is not informative, the optimal strategy is still to withdraw. To sum up, a rational and risk neutral creditor should always decide to withdraw if he received a recommendation from the rating agency to do so. Our experimental results are shown in Figure 6.

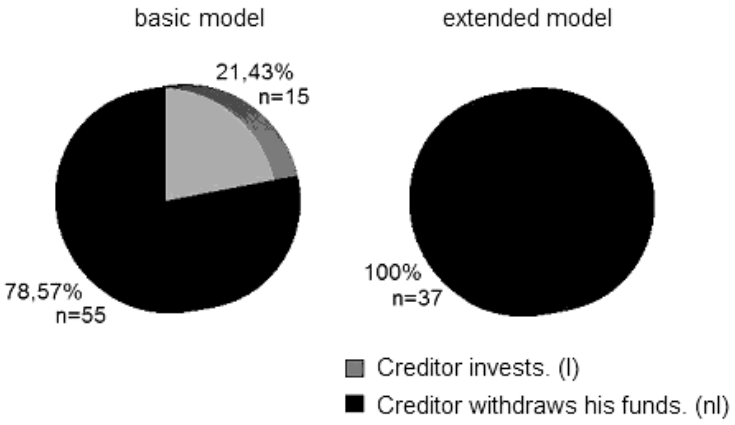


Figure 6: Behavior of creditors after recommendation to withdraw

Figure 4 shows that in the extended model all creditors decide to withdraw after a corresponding recommendation received by the rating agency. In the basic model, 21,43% of all creditors deviate from the optimal strategy and invest in spite of a withdrawal recommendation. These findings are also given in Table 9.

	Investment (I)	Withdrawal (nI)	Total
Basic Model	15	55	70
Extended Model	0	37	37

Table 9: Decision of creditors after recommendation to withdraw (number of observations)

The nullhypothesis of equal probability between the decision to withdraw and to invest can be rejected at the 1% significance level for both settings, based on a chi-squared test. The decision to withdraw is the preferred strategy of creditors after a recommendation to withdraw. Whereas the decision to withdraw has been taken by all creditors in the extended model, the nullhypothesis of withdrawal to be the only decision has to be rejected for the basic model on a signifiance level of 1%. This is also reflected if we compare both settings, the nullhypothesis of no difference between both settings can also be rejected on a 1% significance level. Thus, the willigness to follow the recommendation to withdraw is significantly higher in the extended model.

5. Conclusion

This paper provides the first experimental test of the influence of self-fulfilling prophecies on financial ratings. The experiment is based on two settings from Kuhner (2001) that differ with respect to the self-fulfilling impact of credit ratings. The results of our experimental study provide strong support for a negative relation between the self-fulfilling impact of ratings and the willingness of rating agencies to reveal their private information on their clients' quality. For the most part, our results are in line with predictions from the theoretical model.

The basic model of Kuhner (2001) characterized by a strong self-fulfilling impact of ratings provides the basis for our first experimental setting. The theoretical solution points to a unique pathological equilibrium where rating agencies never reveal their private information and cause creditors to withdraw their funds. In the extended version of this model which corresponds to our second experimental setting, the self-fulfilling impact of ratings is weaker. In addition to the pathological equilibrium there also exists a separating equilibrium in which rating agencies correctly reveal their private information and creditors rely on this information.

The incentives implemented in the theoretical framework are based on rating agencies' aim to establish and maintain a good reputation. A risk neutral and rational creditor then decides based on his expected payoffs. Our experimental results show that rating agencies are less willing to reveal their private information when their recommendations have self-

fulfilling properties. Since the debtor always goes bankrupt after a creditor's withdrawal, rating agencies' recommendation to withdraw seems correct from an ex post point of view as soon as the creditor follows her rating and withdraws. Due to this strong self-fulfilling impact of recommendations to withdraw within the basic model, we find that rating agencies are significantly more likely to recommend withdrawal inspite of opposed private information on their clients than in our second experimental setting. In our second setting we observe that rating agencies are more likely to assign a rating which corresponds to the signal they have observed. If the self-fulfilling impact of ratings is lowered, rating agencies are more likely to reveal their private information and the credibility of their recommendations increases.

Our findings have important implications for the design of incentive structures at financial markets. To ensure that rating agencies correctly reveal their private information in times when their evaluations have strong self-fulfilling effects, it is important to introduce legal mechanisms to control the quality of ratings. This is especially important during systemic crises when market participants strongly depend on informations revealed by rating agencies. Under such circumstances ratings are likely to emerge as self-fulfilling since creditors are not able to collect enough information themselves and tend to cumulatively withdraw their funds. If no institutional or regulatory system is established to control the credibility of ratings, incorrect ratings then force even debtors of good creditworthiness into bankruptcy.

References

Boot, A., Milbourn , T., and Schmeits, A. (2003): The Role of Credit Ratings and Agencies in Coordinating Managerial Behavior. Working Paper.

Branas-Garza, P., Fatas, E.F. and Guillen, P. (2006): Inducing a Self-Fulfilling Prophecy in Public Goods Games. Working Paper.

Cameron, L. A. (1999): Raising the stakes in the ultimatum game: Experimental evidence from Indonesia. Econ. Inq. 37, p. 47–59.

Carlson, M. and Hale, G.B. (2006): Rating Agencies and Sovereign Debt Roll-Over, in: Topics in Macroeconomis 6, p. 1-32.

Davis, D. D. and Holt, C. A. (1993): Experimental Economics, Princeton, NJ: Princeton University Press.

Diamond, D.W. and Dybvig, B.H. (1983): Bank runs, deposit insurance, and liquidity, in: Journal of Political Economy 91, p. 401-419.

Fischbacher, Urs (1999): z-Tree - Zurich Toolbox for Readymade Economic Experiments - Experimenter's Manual, Working Paper Nr. 21, Institute for Empirical Research in Economics, University of Zurich.

Friedman, D. and Sunder, S. (eds) (1994): Experimental methods : a primer for economists, Camebridge: Camebridge University Press.

Güth,W., Schmittberger, R. and Schwarze, B. (1982): An experimental analysis of ultimatum bargaining. J. Econ. Behav. Organ. 3, p. 367–388.

Henrich, J. et al. (2001): In search of Homo economicus: behavioral experiments in 15 small-scale societies. Am. Econ. Rev. 91, p. 73–78.

Kagel, J. H. and Roth, A. E. (eds) (1995): The Handbook of Experimental Economics, Princeton, NJ: Princeton University Press.

Kuhner, C. (2001): Financial rating agencies: are they credible? – Insights into the reporting incentives of rating agencies in times of enhanced systemic risk. Schmalenbach Business Review 53, p. 2-26.

Madiès, P. (2003): Self-fulfilling bank panics: how to avoid them ? an experimental study. Working Paper.

Roth, A., Prasnikar, V., Okuno-Fujiwara, M. and Zamir, S. (1991): Bargaining and market behavior in Jerusalem, Ljubljana, Pittsburgh and Tokyo: An experimental study. Am. Econ. Rev. 81, p. 1068–1095.

Siegel, S. and Castellan, N. J., Jr. (1988): Nonparametric Statistics for the Behavioral Sciences, New Yorek: McGraw-Hill.

Slonim, R. and Roth, A. E. (1998): Learning in high stakes ultimatum games: An experiment in the Slovak republic. Econometrica 66, 569–596.

Appendix I: Instructions of Setting 1

Herzlich Willkommen zum Experiment!

Bitte kommunizieren Sie ab jetzt nicht mit anderen Teilnehmern. Falls Sie eine Frage zum Experiment haben, äußern Sie sie bitte nicht laut, sondern heben Sie bitte die Hand! Wir werden dann zu Ihnen kommen und Ihre Frage beantworten.
Achten Sie bitte darauf, dass diese Instruktionen aus drei Seiten bestehen.

Es gibt die zwei Teilnehmertypen:

- die Teilnehmer 1-16 sind immer Typ **X,**
- die Teilnehmer 17-32 sind immer Typ **Y**.

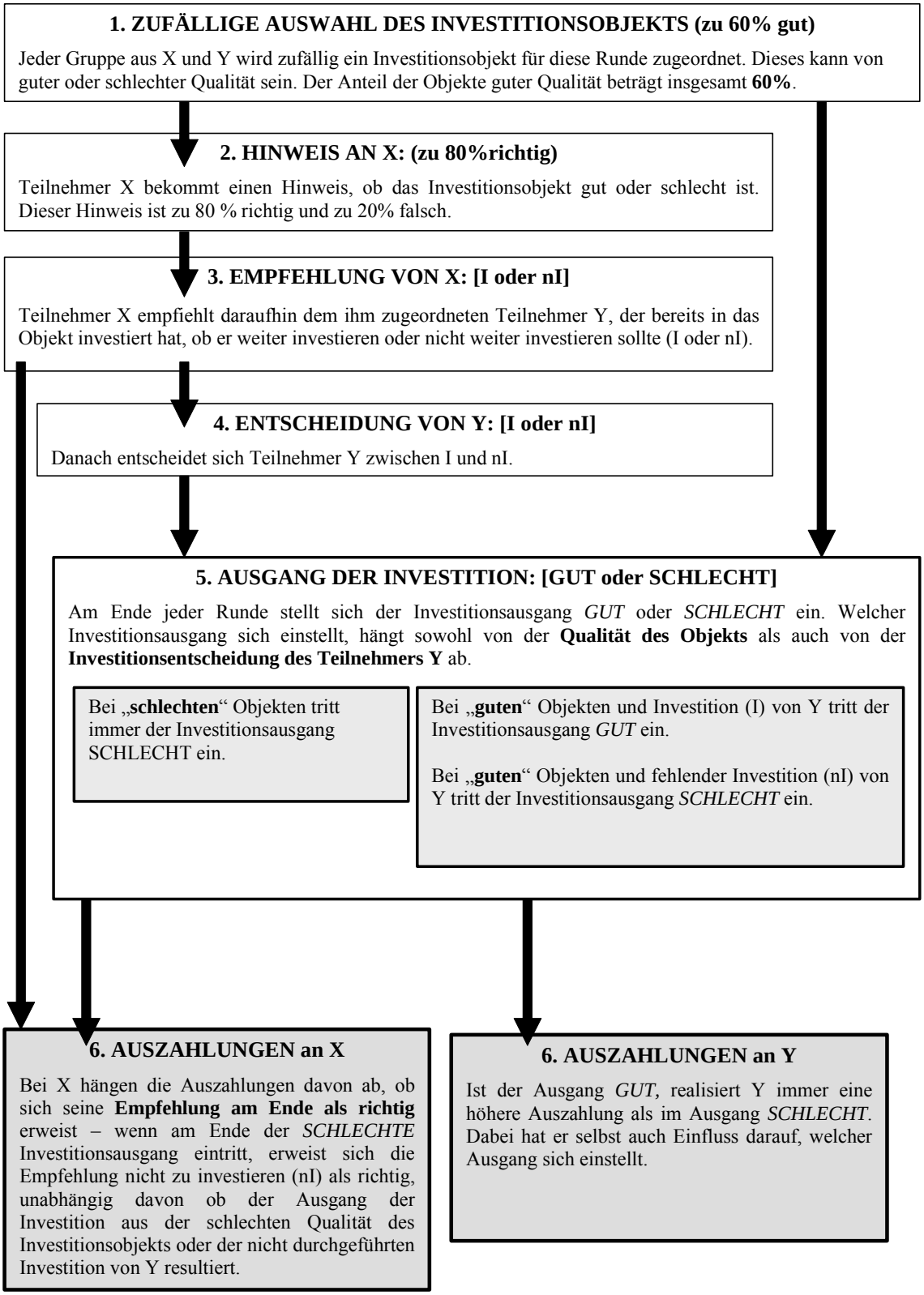
Welcher Typ Sie sind, können Sie der Nummer Ihres Sitzplatzes entnehmen.

Ablauf des Experiments:
Das Experiment besteht aus 30 unabhängig voneinander gespielten Runden. In jeder Runde werden per Zufall Paare aus jeweils einem Teilnehmer X und einem Teilnehmer Y gebildet. Alle Zuteilungen erfolgen anonym, sie werden zu keinem Zeitpunkt die Identität der anderen Teilnehmer erfahren.

Ihre Vergütung:
Nach Beendigung des Experiments wird eine der 30 gespielten Runden per Zufallsverfahren ausgewählt.
Die Taler, die Sie in dieser Runde des Experimentes verdient haben, werden Ihnen dann im Verhältnis 100:1 in Euro ausgezahlt.
Bei einem Verdienst von z.B. 1000 Experimenttalern in der ausgewählten Runde bekommen Sie damit eine Auszahlung von 10€. Zusätzlich erhalten Sie auch die Show-Up Fee von 2,50€ .

Bitte umblättern

Ablauf jeder Runde:



Auszahlungsstruktur des Experiments

X empfiehlt	Y wählt Aktion ….	Wenn Objektqualität in dieser Runde… war	tritt der Investitionsausgang…ein.	Dann erhalten die Teilnehmer folgende Auszahlungen pro Runde	
				X	Y
I	nI	gut	SCHLECHT	0	650
		schlecht	SCHLECHT	0	650
	I	gut	GUT	1000	1000
		schlecht	SCHLECHT	0	0
nI	nI	gut	SCHLECHT	1000	650
		schlecht	SCHLECHT	1000	650
	I	gut	GUT	400	1000
		schlecht	SCHLECHT	1000	0

TYP X

Als Typ X ist es Ihre Aufgabe, Teilnehmer Y zu empfehlen, ob er in das Investitionsobjekt weiter investieren (I) oder nicht mehr investieren (nI) sollte. Da nur Sie den zusätzlichen Hinweis über die Qualität des Objektes bekommen, sind Sie besser informiert als Y. Sie kennen die Objektqualität mit einer Genauigkeit von 80%.
Ihre Empfehlung zu investieren (I) erweist sich im *GUTEN* Investitionsausgang als richtig. Tritt der *SCHLECHTE* Ausgang ein, so wäre die Empfehlung, nicht zu investieren (nI), richtig gewesen. Neben der Qualität bestimmt die Entscheidung von Y den Investitionsausgang. Investiert Y nicht weiter (nI), kann der *SCHLECHTE* Ausgang auch bei guter Objektqualität eintreten.
Wenn sich Ihre Empfehlung als richtig erweist, erhalten Sie **1000** Taler. Ist sie falsch, erhalten Sie:

- **0** Taler bei Empfehlung zu investieren (I), wenn der Investitionsausgang *SCHLECHT* eintritt,
- **400** Taler bei Empfehlung nicht zu investieren (nI), wenn der Investitionsausgang *GUT* eintritt.

TYP Y

Als Typ Y haben Sie bereits in das Investitionsobjekt investiert. In jeder Runde entscheiden Sie, ob Sie weiterhin investieren (I) oder nicht mehr investieren (nI) wollen. Als Entscheidungshilfe erhalten Sie die Empfehlung von Teilnehmer X, der die Objektqualität mit einer Genauigkeit von 80% kennt. Sie wissen lediglich, dass der Anteil guter Objekte 60% beträgt. Ob Sie der Empfehlung von X nachkommen, liegt bei Ihnen. Neben der Qualität beeinflusst auch Ihre Investitionsentscheidung den Ausgang jeder Runde. Investieren Sie nicht (nI), kann der *SCHLECHTE* Ausgang auch bei guter Objektqualität eintreten. Vom Ausgang und von Ihren Entscheidungen hängt Ihre Auszahlung ab:

- Nur im Investitionsausgang *GUT* erhalten Sie den vollen Betrag von 1000 Talern.
- Im Investitionsausgang *SCHLECHT*, erhalten Sie immer weniger.
    - Sie bekommen 650 Taler, wenn sie vorher nicht investiert haben (nI).
    - Haben Sie investiert (I), bekommen Sie nichts.

Appendix II: Instructions Setting 2

Herzlich Willkommen zum Experiment!

Bitte kommunizieren Sie ab jetzt nicht mit anderen Teilnehmern. Falls Sie eine Frage zum Experiment haben, äußern Sie sie bitte nicht laut, sondern heben Sie bitte die Hand! Wir werden dann zu Ihnen kommen und Ihre Frage beantworten.
Achten Sie bitte darauf, dass diese Instruktionen aus drei Seiten bestehen.

Es gibt die zwei Teilnehmertypen:

- die Teilnehmer 1-16 sind immer Typ **X,**
- die Teilnehmer 17-32 sind immer Typ **Y**.

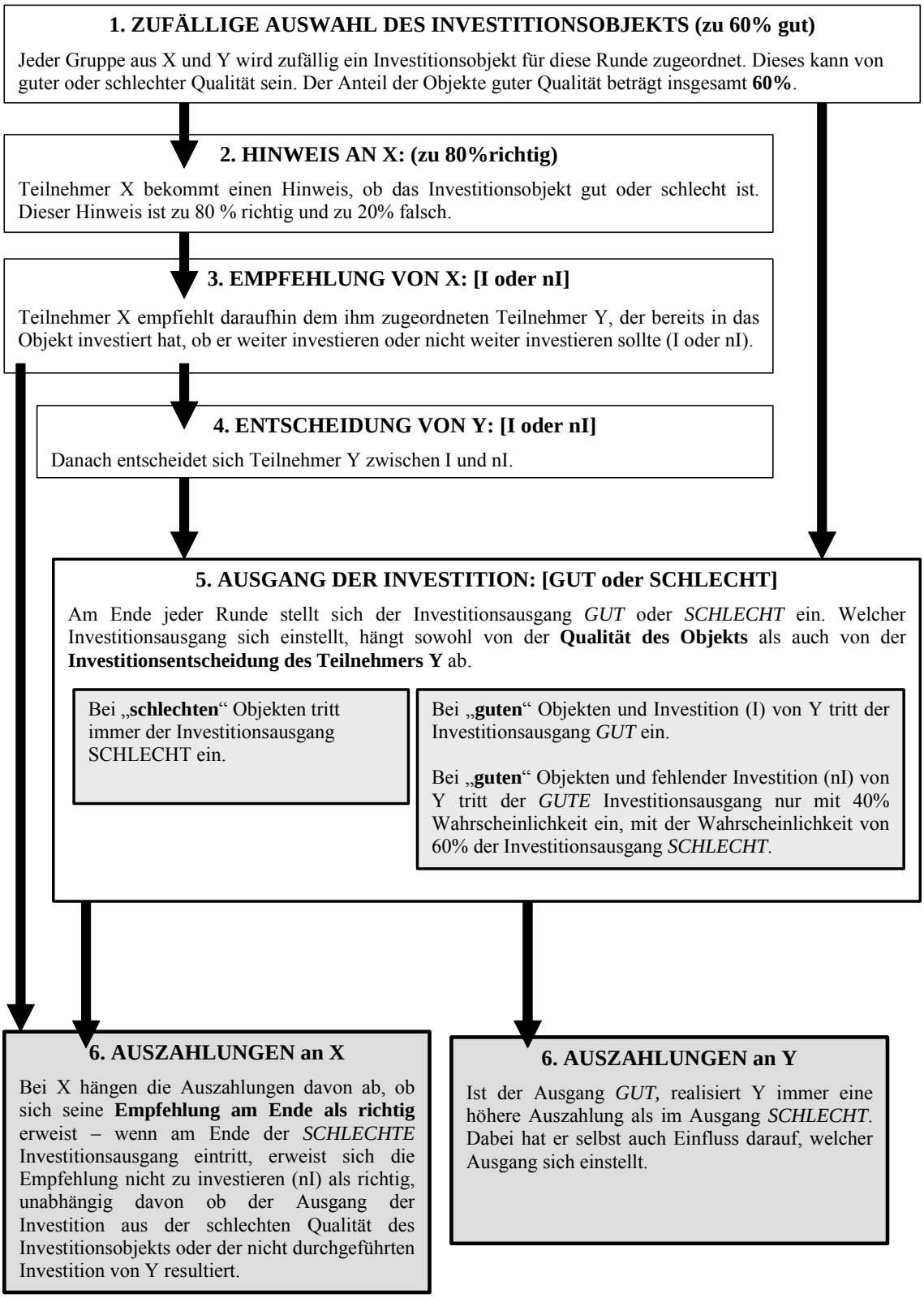
Welcher Typ Sie sind, können Sie der Nummer Ihres Sitzplatzes entnehmen.

Ablauf des Experiments:
Das Experiment besteht aus 30 unabhängig voneinander gespielten Runden. In jeder Runde werden per Zufall Paare aus jeweils einem Teilnehmer X und einem Teilnehmer Y gebildet. Alle Zuteilungen erfolgen anonym, sie werden zu keinem Zeitpunkt die Identität der anderen Teilnehmer erfahren.

Ihre Vergütung:
Nach Beendigung des Experiments wird eine der 30 gespielten Runden per Zufallsverfahren ausgewählt.
Die Taler, die Sie in dieser Runde des Experimentes verdient haben, werden Ihnen dann im Verhältnis 100:1 in Euro ausgezahlt.
Bei einem Verdienst von z.B. 1000 Experimenttalern in der ausgewählten Runde bekommen Sie damit eine Auszahlung von 10€. Zusätzlich erhalten Sie auch die Show-Up Fee von 2,50€ .

Bitte umblättern

Ablauf jeder Runde:



Auszahlungsstruktur des Experiments

X empfiehlt	Y wählt Aktion… .	Wenn Objektqualität in dieser Runde… war	tritt der Investitionsausgang…ein.	Dann erhalten die Teilnehmer folgende Auszahlungen pro Runde X	Y
I	nI	gut	SCHLECHT (60%)	0	650
			GUT (40%)	1000	1000
		schlecht	SCHLECHT	0	650
	I	gut	GUT	1000	1000
		schlecht	SCHLECHT	0	0
nI	nI	gut	SCHLECHT (60%)	1000	650
			GUT (40%)	400	1000
		schlecht	SCHLECHT	1000	650
	I	gut	GUT	400	1000
		schlecht	SCHLECHT	1000	0

TYP X

Als Typ X ist es Ihre Aufgabe, Teilnehmer Y zu empfehlen, ob er in das Investitionsobjekt weiter investieren (I) oder nicht mehr investieren (nI) sollte. Da nur Sie den zusätzlichen Hinweis über die Qualität des Objektes bekommen, sind Sie besser informiert als Y. Sie kennen die Objektqualität mit einer Genauigkeit von 80%.
Ihre Empfehlung zu investieren (I) erweist sich im *GUTEN* Investitionsausgang als richtig. Tritt der *SCHLECHTE* Ausgang ein, so wäre die Empfehlung, nicht zu investieren (nI), richtig gewesen. Neben der Qualität bestimmt die Entscheidung von Y den Investitionsausgang. Investiert Y nicht weiter (nI), kann der *SCHLECHTE* Ausgang auch bei guter Objektqualität eintreten.
Wenn sich Ihre Empfehlung als richtig erweist, erhalten Sie **1000** Taler. Ist sie falsch, erhalten Sie:

- **0** Taler bei Empfehlung zu investieren (I), wenn der Investitionsausgang *SCHLECHT* eintritt,
- **400** Taler bei Empfehlung nicht zu investieren (nI), wenn der Investitionsausgang *GUT* eintritt.

TYP Y

Als Typ Y haben Sie bereits in das Investitionsobjekt investiert. In jeder Runde entscheiden Sie, ob Sie weiterhin investieren (I) oder nicht mehr investieren (nI) wollen. Als Entscheidungshilfe erhalten Sie die Empfehlung von Teilnehmer X, der die Objektqualität mit einer Genauigkeit von 80% kennt. Sie wissen lediglich, dass der Anteil guter Objekte 60% beträgt. Ob Sie der Empfehlung von X nachkommen, liegt bei Ihnen. Neben der Qualität beeinflusst auch Ihre Investitionsentscheidung den Ausgang jeder Runde. Investieren Sie nicht (nI), kann der *SCHLECHTE* Ausgang auch bei guter Objektqualität eintreten. Vom Ausgang und von Ihren Entscheidungen hängt Ihre Auszahlung ab:

- Nur im Investitionsausgang *GUT* erhalten Sie den vollen Betrag von 1000 Talern.
- Im Investitionsausgang *SCHLECHT*, erhalten Sie immer weniger.
    - Sie bekommen 650 Taler, wenn sie vorher nicht investiert haben (nI).
    - Haben Sie investiert (I), bekommen Sie nichts.

CFR Working Paper Series

centre for financial research cologne

CFR working papers are available for download from **www.cfr-cologne.de**.

Hardcopies can be ordered from: centre for financial research (CFR), Albertus Magnus Platz, 50923 Koeln, Germany.

2012

No.	Author(s)	Title
12-06	A. Kempf, A. Pütz, F. Sonnenburg	Fund Manager Duality: Impact on Performance and Investment Behavior
12-05	R. Wermers	Runs on Money Market Mutual Funds
12-04	R. Wermers	A matter of style: The causes and consequences of style drift in institutional portfolios
12-03	C. Andres, A. Betzer, I. van den Bongard, C. Haesner, E. Theissen	Dividend Announcements Reconsidered: Dividend Changes versus Dividend Surprises
12-02	C. Andres, E. Fernau, E. Theissen	Is It Better To Say Goodbye? When Former Executives Set Executive Pay
12-01	L. Andreu, A. Pütz	Are Two Business Degrees Better Than One? Evidence from Mutual Fund Managers' Education

2011

No.	Author(s)	Title
11-16	V. Agarwal, J.-P. Gómez, R. Priestley	Management Compensation and Market Timing under Portfolio Constraints
11-15	T. Dimpfl, S. Jank	Can Internet Search Queries Help to Predict Stock Market Volatility?
11-14	P. Gomber, U. Schweickert, E. Theissen	Liquidity Dynamics in an Electronic Open Limit Order Book: An Event Study Approach
11-13	D. Hess, S. Orbe	Irrationality or Efficiency of Macroeconomic Survey Forecasts? Implications from the Anchoring Bias Test
11-12	D. Hess, P. Immenkötter	Optimal Leverage, its Benefits, and the Business Cycle
11-11	N. Heinrichs, D. Hess, C. Homburg, M. Lorenz, S. Sievers	Extended Dividend, Cash Flow and Residual Income Valuation Models – Accounting for Deviations from Ideal Conditions
11-10	A. Kempf, O. Korn, S. Saßning	Portfolio Optimization using Forward - Looking Information

11-09	V. Agarwal, S. Ray	Determinants and Implications of Fee Changes in the Hedge Fund Industry
11-08	G. Cici, L.-F. Palacios	On the Use of Options by Mutual Funds: Do They Know What They Are Doing?
11-07	V. Agarwal, G. D. Gay, L. Ling	Performance inconsistency in mutual funds: An investigation of window-dressing behavior
11-06	N. Hautsch, D. Hess, D. Veredas	The Impact of Macroeconomic News on Quote Adjustments, Noise, and Informational Volatility
11-05	G. Cici	The Prevalence of the Disposition Effect in Mutual Funds' Trades
11-04	S. Jank	Mutual Fund Flows, Expected Returns and the Real Economy
11-03	G.Fellner, E.Theissen	Short Sale Constraints, Divergence of Opinion and Asset Value: Evidence from the Laboratory
11-02	S.Jank	Are There Disadvantaged Clienteles in Mutual Funds?
11-01	V. Agarwal, C. Meneghetti	The Role of Hedge Funds as Primary Lenders

2010

No.	Author(s)	Title
10-20	G. Cici, S. Gibson, J.J. Merrick Jr.	Missing the Marks? Dispersion in Corporate Bond Valuations Across Mutual Funds
10-19	J. Hengelbrock, E. Theissen, C. Westheide	Market Response to Investor Sentiment
10-18	G. Cici, S. Gibson	The Performance of Corporate-Bond Mutual Funds: Evidence Based on Security-Level Holdings
10-17	D. Hess, D. Kreutzmann, O. Pucker	Projected Earnings Accuracy and the Profitability of Stock Recommendations
10-16	S. Jank, M. Wedow	Sturm und Drang in Money Market Funds: When Money Market Funds Cease to Be Narrow
10-15	G. Cici, A. Kempf, A. Puetz	The Valuation of Hedge Funds' Equity Positions
10-14	J. Grammig, S. Jank	Creative Destruction and Asset Prices
10-13	S. Jank, M. Wedow	Purchase and Redemption Decisions of Mutual Fund Investors and the Role of Fund Families
10-12	S. Artmann, P. Finter, A. Kempf, S. Koch, E. Theissen	The Cross-Section of German Stock Returns: New Data and New Evidence
10-11	M. Chesney, A. Kempf	The Value of Tradeability
10-10	S. Frey, P. Herbst	The Influence of Buy-side Analysts on Mutual Fund Trading
10-09	V. Agarwal, W. Jiang, Y. Tang, B. Yang	Uncovering Hedge Fund Skill from the Portfolio Holdings They Hide
10-08	V. Agarwal, V. Fos, W. Jiang	Inferring Reporting Biases in Hedge Fund Databases from Hedge Fund Equity Holdings
10-07	V. Agarwal, G. Bakshi,	Do Higher-Moment Equity Risks Explain Hedge Fund

	J. Huij	Returns?
10-06	J. Grammig, F. J. Peter	Tell-Tale Tails
10-05	K. Drachter, A. Kempf	Höhe, Struktur und Determinanten der Managervergütung-Eine Analyse der Fondsbranche in Deutschland
10-04	J. Fang, A. Kempf, M. Trapp	Fund Manager Allocation
10-03	P. Finter, A. Niessen-Ruenzi, S. Ruenzi	The Impact of Investor Sentiment on the German Stock Market
10-02	D. Hunter, E. Kandel, S. Kandel, R. Wermers	Endogenous Benchmarks
10-01	S. Artmann, P. Finter, A. Kempf	Determinants of Expected Stock Returns: Large Sample Evidence from the German Market

2009

No.	Author(s)	Title
09-17	E. Theissen	Price Discovery in Spot and Futures Markets: A Reconsideration
09-16	M. Trapp	Trading the Bond-CDS Basis – The Role of Credit Risk and Liquidity
09-15	A. Betzer, J. Gider, D.Metzger, E. Theissen	Strategic Trading and Trade Reporting by Corporate Insiders
09-14	A. Kempf, O. Korn, M. Uhrig-Homburg	The Term Structure of Illiquidity Premia
09-13	W. Bühler, M. Trapp	Time-Varying Credit Risk and Liquidity Premia in Bond and CDS Markets
09-12	W. Bühler, M. Trapp	Explaining the Bond-CDS Basis – The Role of Credit Risk and Liquidity
09-11	S. J. Taylor, P. K. Yadav, Y. Zhang	Cross-sectional analysis of risk-neutral skewness
09-10	A. Kempf, C. Merkle, A. Niessen-Ruenzi	Low Risk and High Return – Affective Attitudes and Stock Market Expectations
09-09	V. Fotak, V. Raman, P. K. Yadav	Naked Short Selling: The Emperor`s New Clothes?
09-08	F. Bardong, S.M. Bartram, P.K. Yadav	Informed Trading, Information Asymmetry and Pricing of Information Risk: Empirical Evidence from the NYSE
09-07	S. J. Taylor , P. K. Yadav, Y. Zhang	The information content of implied volatilities and model-free volatility expectations: Evidence from options written on individual stocks
09-06	S. Frey, P. Sandas	The Impact of Iceberg Orders in Limit Order Books
09-05	H. Beltran-Lopez, P. Giot, J. Grammig	Commonalities in the Order Book
09-04	J. Fang, S. Ruenzi	Rapid Trading bei deutschen Aktienfonds: Evidenz aus einer großen deutschen Fondsgesellschaft
09-03	A. Banegas, B. Gillen, A. Timmermann, R. Wermers	The Performance of European Equity Mutual Funds

09-02	J. Grammig, A. Schrimpf, M. Schuppli	Long-Horizon Consumption Risk and the Cross-Section of Returns: New Tests and International Evidence
09-01	O. Korn, P. Koziol	The Term Structure of Currency Hedge Ratios

2008

No.	Author(s)	Title
08-12	U. Bonenkamp, C. Homburg, A. Kempf	Fundamental Information in Technical Trading Strategies
08-11	O. Korn	Risk Management with Default-risky Forwards
08-10	J. Grammig, F.J. Peter	International Price Discovery in the Presence of Market Microstructure Effects
08-09	C. M. Kuhnen, A. Niessen	Public Opinion and Executive Compensation
08-08	A. Pütz, S. Ruenzi	Overconfidence among Professional Investors: Evidence from Mutual Fund Managers
08-07	P. Osthoff	What matters to SRI investors?
08-06	A. Betzer, E. Theissen	Sooner Or Later: Delays in Trade Reporting by Corporate Insiders
08-05	P. Linge, E. Theissen	Determinanten der Aktionärspräsenz auf Hauptversammlungen deutscher Aktiengesellschaften
08-04	N. Hautsch, D. Hess, C. Müller	Price Adjustment to News with Uncertain Precision
08-03	D. Hess, H. Huang, A. Niessen	How Do Commodity Futures Respond to Macroeconomic News?
08-02	R. Chakrabarti, W. Megginson, P. Yadav	Corporate Governance in India
08-01	C. Andres, E. Theissen	Setting a Fox to Keep the Geese - Does the Comply-or-Explain Principle Work?

2007

No.	Author(s)	Title
07-16	M. Bär, A. Niessen, S. Ruenzi	The Impact of Work Group Diversity on Performance: Large Sample Evidence from the Mutual Fund Industry
07-15	A. Niessen, S. Ruenzi	Political Connectedness and Firm Performance: Evidence From Germany
07-14	O. Korn	Hedging Price Risk when Payment Dates are Uncertain
07-13	A. Kempf, P. Osthoff	SRI Funds: Nomen est Omen
07-12	J. Grammig, E. Theissen, O. Wuensche	Time and Price Impact of a Trade: A Structural Approach
07-11	V. Agarwal, J. R. Kale	On the Relative Performance of Multi-Strategy and Funds of Hedge Funds
07-10	M. Kasch-Haroutounian, E. Theissen	Competition Between Exchanges: Euronext versus Xetra
07-09	V. Agarwal, N. D. Daniel, N. Y. Naik	Do hedge funds manage their reported returns?

07-08	N. C. Brown, K. D. Wei, R. Wermers	Analyst Recommendations, Mutual Fund Herding, and Overreaction in Stock Prices
07-07	A. Betzer, E. Theissen	Insider Trading and Corporate Governance: The Case of Germany
07-06	V. Agarwal, L. Wang	Transaction Costs and Value Premium
07-05	J. Grammig, A. Schrimpf	Asset Pricing with a Reference Level of Consumption: New Evidence from the Cross-Section of Stock Returns
07-04	V. Agarwal, N.M. Boyson, N.Y. Naik	Hedge Funds for retail investors? An examination of hedged mutual funds
07-03	D. Hess, A. Niessen	The Early News Catches the Attention: On the Relative Price Impact of Similar Economic Indicators
07-02	A. Kempf, S. Ruenzi, T. Thiele	Employment Risk, Compensation Incentives and Managerial Risk Taking - Evidence from the Mutual Fund Industry -
07-01	M. Hagemeister, A. Kempf	CAPM und erwartete Renditen: Eine Untersuchung auf Basis der Erwartung von Marktteilnehmern

2006

No.	Author(s)	Title
06-13	S. Čeljo-Hörhager, A. Niessen	How do Self-fulfilling Prophecies affect Financial Ratings? - An experimental study
06-12	R. Wermers, Y. Wu, J. Zechner	Portfolio Performance, Discount Dynamics, and the Turnover of Closed-End Fund Managers
06-11	U. v. Lilienfeld-Toal, S. Ruenzi	Why Managers Hold Shares of Their Firm: An Empirical Analysis
06-10	A. Kempf, P. Osthoff	The Effect of Socially Responsible Investing on Portfolio Performance
06-09	R. Wermers, T. Yao, J. Zhao	Extracting Stock Selection Information from Mutual Fund holdings: An Efficient Aggregation Approach
06-08	M. Hoffmann, B. Kempa	The Poole Analysis in the New Open Economy Macroeconomic Framework
06-07	K. Drachter, A. Kempf, M. Wagner	Decision Processes in German Mutual Fund Companies: Evidence from a Telephone Survey
06-06	J.P. Krahnen, F.A. Schmid, E. Theissen	Investment Performance and Market Share: A Study of the German Mutual Fund Industry
06-05	S. Ber, S. Ruenzi	On the Usability of Synthetic Measures of Mutual Fund Net-Flows
06-04	A. Kempf, D. Mayston	Liquidity Commonality Beyond Best Prices
06-03	O. Korn, C. Koziol	Bond Portfolio Optimization: A Risk-Return Approach
06-02	O. Scaillet, L. Barras, R. Wermers	False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas
06-01	A. Niessen, S. Ruenzi	Sex Matters: Gender Differences in a Professional Setting

2005

No.	Author(s)	Title
05-16	E. Theissen	An Analysis of Private Investors´ Stock Market Return Forecasts

05-15	T. Foucault, S. Moinas, E. Theissen	Does Anonymity Matter in Electronic Limit Order Markets
05-14	R. Kosowski, A. Timmermann, R. Wermers, H. White	Can Mutual Fund „Stars“ Really Pick Stocks? New Evidence from a Bootstrap Analysis
05-13	D. Avramov, R. Wermers	Investing in Mutual Funds when Returns are Predictable
05-12	K. Griese, A. Kempf	Liquiditätsdynamik am deutschen Aktienmarkt
05-11	S. Ber, A. Kempf, S. Ruenzi	Determinanten der Mittelzuflüsse bei deutschen Aktienfonds
05-10	M. Bär, A. Kempf, S. Ruenzi	Is a Team Different From the Sum of Its Parts? Evidence from Mutual Fund Managers
05-09	M. Hoffmann	Saving, Investment and the Net Foreign Asset Position
05-08	S. Ruenzi	Mutual Fund Growth in Standard and Specialist Market Segments
05-07	A. Kempf, S. Ruenzi	Status Quo Bias and the Number of Alternatives - An Empirical Illustration from the Mutual Fund Industry
05-06	J. Grammig, E. Theissen	Is Best Really Better? Internalization of Orders in an Open Limit Order Book
05-05	H. Beltran-Lopez, J. Grammig, A.J. Menkveld	Limit order books and trade informativeness
05-04	M. Hoffmann	Compensating Wages under different Exchange rate Regimes
05-03	M. Hoffmann	Fixed versus Flexible Exchange Rates: Evidence from Developing Countries
05-02	A. Kempf, C. Memmel	Estimating the Global Minimum Variance Portfolio
05-01	S. Frey, J. Grammig	Liquidity supply and adverse selection in a pure limit order book market

2004

No.	Author(s)	Title
04-10	N. Hautsch, D. Hess	Bayesian Learning in Financial Markets – Testing for the Relevance of Information Precision in Price Discovery
04-09	A. Kempf, K. Kreuzberg	Portfolio Disclosure, Portfolio Selection and Mutual Fund Performance Evaluation
04-08	N.F. Carline, S.C. Linn, P.K. Yadav	Operating performance changes associated with corporate mergers and the role of corporate governance
04-07	J.J. Merrick, Jr., N.Y. Naik, P.K. Yadav	Strategic Trading Behaviour and Price Distortion in a Manipulated Market: Anatomy of a Squeeze
04-06	N.Y. Naik, P.K. Yadav	Trading Costs of Public Investors with Obligatory and Voluntary Market-Making: Evidence from Market Reforms
04-05	A. Kempf, S. Ruenzi	Family Matters: Rankings Within Fund Families and Fund Inflows
04-04	V. Agarwal, N.D. Daniel, N.Y. Naik	Role of Managerial Incentives and Discretion in Hedge Fund Performance
04-03	V. Agarwal, W.H. Fung, J.C. Loon, N.Y. Naik	Risk and Return in Convertible Arbitrage: Evidence from the Convertible Bond Market
04-02	A. Kempf, S. Ruenzi	Tournaments in Mutual Fund Families

04-01	I. Chowdhury, M. Hoffmann, A. Schabert	Inflation Dynamics and the Cost Channel of Monetary Transmission

centre for financial research
cfr/university of cologne
Albertus-Magnus-Platz
D-50923 cologne
Fon +49(0)221-470-6995
Fax +49(0)221-470-3992
kempf@cfr-cologne.de
www.cfr-cologne.de