

An experiment on economic news, affective news,  
and readers' macroeconomic predictions

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## **Abstract**

This paper presents the results of an experimental survey among students, who were asked to predict the likely macroeconomic consequences of several economically relevant and irrelevant events. These hypothetical events were presented as newspaper articles in two framings. Three results stand out: First, people predict economically insignificant events to have macroeconomic impact, if these events are emotionally salient. Second, affective cues irrelevant from the perspective of economic theory influence the predictions. Finally, students with more theoretical knowledge are less susceptible to affective information, if the theory is applicable. These findings might be highly relevant to the explanation of macroeconomic fluctuations.

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## 1 Introduction

What kind of information do people use to form economic predictions? In most economic models, agents think about the economy in terms of economic models and rationally evaluate the consequences of events using economic theory only. Two assumptions about these *homines economici* may be fundamentally different from how real human beings think about the economy. First, most people have lay theories about the economy which may be very different from standard economic theory. Second, people's evaluations of events are not only the result of cognitive processes but also strongly influenced by emotions. If this is true, some theories based on *homo economicus* might have difficulties to explain real world phenomena adequately. One example is business cycle theory. The current standard models are microfounded dynamic stochastic general equilibrium models. The crucial assumption of this theory is that individuals are forward-looking and interpret economic events (or shocks) within the respective model. People know the consequences of a shock to the economy and adjust their behavior such that it maximizes their intertemporal utility.

One finding by Cochrane (1994) critical for business cycle theory is that consumption shocks are empirically far more important than other types of shocks. Cochrane speculates that consumers have news about the future of the economy which observing economists cannot see. These news may be idiosyncratic to every consumer and therefore not statistically visible. However, every consumer adjusts his behavior to these idiosyncratic news, which is observable in the aggregate and may lead to the impression that an exogenous change of consumption caused a boom or a recession. Cochrane concludes that if this explanation is true, "we may forever be ignorant of the true shocks that drive fluctuations" (Cochrane 1994, p. 50-51). But this assessment of the theoretical and empirical possibilities to explain and fore-

cast business cycles may be too pessimistic. It might be that the relevant shocks are observable, but not in the way it is usually done. It could be that consumers' behavior is influenced by political or other events which current economic theory classifies as economically irrelevant.

In this paper, I report the results of an experiment designed to investigate three questions: 1. Which kinds of news do readers of newspapers consider to be relevant for the macroeconomy? 2. Do people react to cues which are irrelevant from the perspective of economic theory? 3. What role does economic knowledge play?

The answers to these questions may be important for both macroeconomics and political economics. The events which influence macroeconomic fluctuations and political elections could be different from those traditionally considered in economic theory. If many people believe that some events are important and others are not, this belief might be self-fulfilling. As Duffy and Fisher (2005) have recently shown experimentally, subjects are ready to coordinate economic decisions using noneconomic signals. They also argue that such signals need a meaningful context in order to influence economic behavior. Since the macroeconomy is not directly observable, people heavily rely on what they learn in the mass media<sup>1</sup>. For many people the mass media, especially TV and newspapers, are the only source of knowledge about economics and politics. However, the mass media are not only transporting information about events, but also interpretations what these events mean and explanations how the economy works. For this reason, one might expect that some news spread by the mass media can serve as sunspots that coordinate people's actions (see Farmer 1999, p. 225, for the same argument).

The paper is structured as follows: Section 2 discusses related literature and the theoretical background of the experiment. Section 3 describes the

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<sup>1</sup>This is different for microeconomic decisions: Here, intuition might work well because they are less abstract and direct feedback is possible.

experiment and the participants and Section 4 states the results. Section 5 concludes.

## **2 Literature and Theory**

This research is based on three different strands of literature: the political science literature on economic voting, the communication research literature on the effects of news frames, and the psychological literature on the importance of emotions for decision making.

In political science it is an important question what the determinants of voting behavior are. It is widely accepted that voters' perceptions about the state of the economy are a decisive factor. One aspect of this question is how objective economic conditions translate into voters' evaluations of economic conditions. Several studies (Nadeau et al. 1999, 2000, Duch/Stevenson 2001, Sanders/Gavin 2004, Soroka 2004) find that voters' economic perceptions and expectations are not directly derived from objective measures of the state of the economy such as the inflation rate or the unemployment rate. They are rather driven by news coverage in the press and especially on TV. If aggregate economic expectations are regressed on news indicators and economic variables, the latter are often insignificant. The mass media not only transport information but also interpretations and explanations, which may lead to a disconnection between actual economic variables and voters' perceptions (Duch/Stevenson 2001).

Conover et al. (1986, 1987) present evidence that voters have little knowledge of the actual unemployment rate and the inflation rate. Forecasts of people with more economic knowledge and higher education are better than those of the poorly informed and educated citizens.

Another finding is that peoples' voting behavior in national elections also depends on variables not directly related to the national economic conditions.

Books and Prysby (1999) show that U.S. voters use the state unemployment rate to infer the national unemployment rate and speculate that this is due to the more salient news coverage of state economic conditions. Similarly, Pattie and Johnston (1998) show that voting in British national elections depend on regional economic conditions.

From this literature, I conclude that people's perceptions and forecasts of macroeconomic conditions are strongly influenced by news coverage in the mass media and that people have little knowledge of the actual conditions. People react stronger to more salient information, even if this leads to unwarranted generalizations.

If mass media news coverage not only transports information, but also shapes people's views about the economy, which may not reflect the actual conditions, it is necessary to analyze how the mass media present their news. This is done in communication research where a strand of the literature analyzes the effects of so-called *news frames* on recipients (see Valkenburg et al. 1999, de Vreese et al. 2001, Shah et al. 2004). A news frame is a schema in which journalists compose news stories to optimize audience accessibility. At least four frames are commonly used: the conflict frame, the human interest frame, the responsibility frame, and the economic consequences frame. Each of these frames serves to raise the audience's interest, simplify events, and give meaning to them. Valkenburg et al. (1999) demonstrate that the same content in different frames provokes different thoughts in readers. Of particular interest for this study is the human interest frame in which a story is presented in a personalized or emotional way. Valkenburg et al. (1999) show that this frame seems to diminish the readers' recollection of information indicating that emotional reactions interfere with cognitive processes. Shah et al. (2004) show that the combination of different frames influences the cognitive complexity with which individuals process information. They further

argue that certain frames may trigger cognitive associations or initiate certain heuristics or cognitive biases so that people's interpretation of the same content depends on the way it is presented.

The psychological literature on the importance of emotions for decision making complements these findings. Modern theories in cognitive psychology and neuroscience postulate that the human brain consists of two systems of information processing working in parallel and influencing each other. These systems are called *reasoning and intuition* (Kahneman 2003), *cool cognitive system and hot emotional system* (Metcalfe/Mischel 1999), *deliberative system and affective system* (Loewenstein/O'Donoghue 2004), or *analytic system and experiential system* (Slovic et al. 2004). Of particular interest for economists is the finding that both judgments and decisions are not only determined by cognition but also by affects. There is compelling evidence that in many cases, affects are necessary to reach good decisions (see Bechara 2004, Slovic et al. 2004, Elster 1998). For example, in situations of ambiguity, i.e. where no distribution of outcome probabilities can be given, intuition may be the only source of usable information. If uncertainty is high, either because of little external information or because of little knowledge or experience on how to interpret the available information, intuition is often used to come to an assessment or decision. In addition, intuition indicates when people should stop searching for more information (Elster 1998). If people have an intuition whether something is good or bad, they are very certain about it and quickly come to a decision.

However, the use of the *affect heuristic* (Slovic et al. 2004), i.e. the use of good or bad feelings arising in an evaluation or decision-making process, may also lead to misguided results. Slovic et al. (2004) argue that the affective system seems to cope well with small changes in our environment, but not with large ones. Similarly, Nisbett et al. (1982) argue that people overweigh vivid,

salient, and concrete information as opposed to remote, pallid, and abstract information. Concrete information activates the affective system, whereas abstract information is processed by the cognitive system. Very salient and concrete information may be important for people's evaluation, even if it is not directly relevant for the issue at hand (van Raaij 1989).

**[Figure 1 about here]**

Taken together, these results suggest the following model how laymen form their evaluations of economic events (see Figure 1). An event is reported by the mass media. The news coverage consists of reported facts and framing, i.e. a schema which gives meaning to the facts or suggests a certain interpretation. Recipients cognitively process the facts and experience an affective response both to the facts and to the framing. The cognitive analysis depends on the relevant knowledge and theoretical background. It is important that in cases of conflict between the cognitive analysis and the affective response, the affective response may overrule the cognitive analysis. The final evaluation of the event is the product of both processes and consists of predicted consequences and an associated degree of certainty.

It seems unlikely that the affective system is well suited to evaluate the macroeconomic consequences of events, because the macroeconomy is abstract and large. In addition, it is difficult to learn from experience since there is no direct feedback. Accordingly, if the affective response to news is strong, we might expect people's predictions about macroeconomic effects of some events to differ strongly from predictions based on economic theory. Based on the previous discussion, I postulate the following hypotheses, which correspond to the numbered arrows in Figure 1:

**Hypothesis 1** *The affective response is strong, if the event is concrete, vivid, and salient.*



**Hypothesis 2** *The affective response is strong, if the framing of the news provokes emotions.*

**Hypothesis 3** *The affective response is strong relative to the cognitive analysis, if the news recipient has little relevant knowledge and little theoretical background.*

**Hypothesis 4** *In case of conflict between the cognitive analysis and the affective response, the affective response will be decisive and certainty will be lower.*

**Hypothesis 5** *The predicted macroeconomic consequences of an event will differ from those based on pure economic reasoning, if the affective response is strong.*

**Hypothesis 6** *People will be more certain with respect to their predictions, if they have a strong affective response which is in line with the result of their cognitive analysis.*

### **3 Experiment**

I designed an experiment with six fictitious news reports<sup>2</sup> covering (in this order) a depreciation of the euro, an oil spill at the German coast, a major tax reform, a relocation of a DaimlerChrysler assembly plant abroad, a closure of military bases, and a terrorist attack against banks in Frankfurt. At the end of May 2005, these reports were shown to 117 students of business administration and economics taking an intermediate course in international macroeconomics at the University of Dortmund<sup>3</sup>. All students had completed at least three introductory courses in economics (microeconomics, macroeconomics, and economic policy). The students were told to participate in a

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<sup>2</sup>A brief summary of the reports is provided in the Appendix.

<sup>3</sup>More details about the participants are given in the Appendix.

survey study about how people evaluate economic news. They were asked to read the texts and to indicate the likely short-run (three months) consequences of the events on five macroeconomic variables in Germany: GDP, the inflation rate, the unemployment rate, sales, and the German stock index (DAX). It was emphasized that they should predict the consequences at the *national* level. Below every news report there was a table containing the five variables and a scale from +5 (increases strongly) to -5 (decreases strongly). The students were asked to mark the most likely number and to write their level of certainty concerning their prediction as a percentage number between 0 (fully uncertain) and 100 (absolutely certain) in a box. In order to give an incentive to answer all the questions seriously, ten times € 5 were randomly allotted among all participants who had returned a completely filled form.

Of the six events two may be unambiguously classified as macroeconomically significant: the euro depreciation and the tax reform. They are likely to have measurable macroeconomic consequences. The medium-term macroeconomic significance of the terrorist attack is difficult to assess. Within the given timeframe strong reactions of consumer confidence and financial markets are plausible. All other events are unlikely to impact the national economy<sup>4</sup>. The predicted effects should hence be zero or very small compared to the economic events. However, I hypothesize that this will not be the case. Due to affective responses of varying degree, I expect non-zero predictions. If the affective response is strong, the predicted consequences will even be large relative to those of the economic events.

It is clear that one cannot observe the affective response without neuropsychological methods. Therefore I can only test Hypotheses 1, 2,

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<sup>4</sup>In the Appendix, I discuss for every event, why I expect large or small macroeconomic effects. In order to objectify these claims a bit, I also asked 11 economists colleagues to assess the likely consequences of the six events. While there was some disagreement about the magnitude of the effects of the tax reform and the euro depreciation, most colleagues thought that the consequences of the other events would be close to zero.

3, and 4 jointly with 5 and 6.

Hypothesis 1 can be tested by having the participants evaluate events with different degrees of concreteness. I expect that more concrete events lead to larger predictions and higher degrees of certainty than more abstract events. With respect to concreteness, three events stand out: the oil pollution, the plant relocation, and the terrorist attack. In contrast to the other events, which are fairly abstract, they are easy to imagine.

Hypothesis 2 is analyzed by a modification of the framing of the texts<sup>5</sup>. Half of the participants received a core version of all texts (control group), in which the events were reported as factual as possible. The second group received extended texts (treatment group), in which the core text was augmented by one short paragraph containing cue words. These cue words convey no additional objective information, but have a strong affective valence. The additional paragraphs are designed to trigger a negative affective response. Students were not told that two different versions of the texts were handed out and were asked not to talk to their neighbors while participating in the survey. *Ceteris paribus*, I expect the predictions in the treatment group to be more pessimistic but more certain than in the control group.

In order to test the third hypothesis, I divide the sample along two dimensions: economics versus business students and native versus foreign students. Economics students are likely to know more about economic theory than business students implying that their evaluations result more from cognitive analyses than from affective responses compared to business students. The effects of the oil pollution, the tax reform, the plant relocation, and the terrorist attack are relatively easy to understand and in most cases even explicitly stated in the text. The effects of the euro depreciation and of the closure of

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<sup>5</sup>Notice that I vary the *framing*, but do not use different media *frames*. In order to use different frames, major changes of the text were necessary, like different headlines, different introductions, or different structures. I only add one paragraph to an otherwise unaltered text.

military bases are more difficult since they work through indirect channels and involve effects working in opposing directions. In particular, economic theory should help to predict the likely consequences of the euro depreciation. Accordingly, I expect that economics students predict a stronger effect in case of the euro depreciation and the tax reform than business students, and weaker effects of the oil pollution and the plant relocation. Concerning the texts about the terrorist attack and the closure of military bases, economics students might not answer differently, because textbook macroeconomic models are not easily applicable to these events.

The foreign students might not be familiar with statistical information about the German economy necessary to assess to magnitude of the effects. Therefore, they might predict larger effects of the noneconomic events than natives. However, from personal experience they are probably able to assess the effects of exchange rate movements more realistically than natives and hence predict stronger effects of the depreciation.

Hypothesis 4, finally, is the most difficult to test since I cannot measure a potential conflict between the cognitive analysis and the affective response. However, it is possible to infer the existence of such a conflict indirectly from the reaction of economics students to the affective cues. If economics students analyze the core text based on their theoretical knowledge, they will cognitively identify the additional affective information as irrelevant. If they do not experience a significant affective response, neither the predictions nor the degrees of certainty will differ between the control group and the treatment group. But if the econ students in the treatment group make predictions more similar to the ones of the business students and at the same time are less certain than the economics students in the control group, I can conclude that they indeed experienced an internal conflict as a consequence of a strong affective response. Vice versa I do not expect business students to experi-

ence strong conflicts. Even in the control group, their predictions are likely to depend strongly on the affective responses. If this is the case, they will not be puzzled by the affective cues but rather interpret them as additional information similar to the other information in the text. Accordingly, among business students the degree of certainty in the treatment group will not be lower but possibly higher than in the control group. A similar argument can be made for the foreign students, which I assume to have more experiential knowledge with respect to the euro depreciation and less with respect to the other events compared to natives. Consequently, I expect them to consider the affective cues as helpful additional information especially for the events other than the euro depreciation.

## 4 Results

Since students in all cases were asked to predict the consequences for Germany in total within the same time frame and all answer scales were identical, we can compare the mean answers across the events.

### 4.1 Affective response to concrete events

According to Hypotheses 1, 5, and 6, the impact of concrete events will be overestimated relative to their macroeconomic significance.

Table 1 lists summary statistics for the total sample without distinction between control and treatment group. All events were seen to have effects on the five macroeconomic variables. With six exceptions ( $UR_{euro}$ ,  $UR_{terror}$ ,  $IR_{plant}$ ,  $IR_{bases}$ ,  $Sales_{euro}$ , and  $DAX_{plant}$ ) all mean answers are significantly different from zero at very low error levels. Of all six events students expect the oil spill to have the largest effects on German GDP and sales. In contrast, the average respondent does not see an effect of the euro depreciation on the unemployment rate and sales and only a small one on GDP. The predicted effects of the tax reform are plausible but small compared to the effects of the

oil pollution and the plant relocation. A final interesting observation is the predicted sales effect of the military base closure. Together with  $Sales_{oil}$ , it is the largest predicted effect on sales. Although this might not be plausible, this prediction is easy to explain, since the text mentioned negative effects on sales in the affected towns. With respect to certainty, it is remarkable that the respondents are relatively uncertain about the effects of the depreciation, but much more certain about the consequences of the plant relocation.

[Table 1 about here]

In order to get a summary statistic of the strength of the individual effects, I calculated the absolute mean of the mean predictions in Table 1 (see Table 2). With the exceptions of inflation and unemployment, all mean predictions in the group of abstract events are significantly lower than those of the concrete events. At least with respect to the concrete events' effects on GDP and the stock market, respondents are also more certain that their predictions are correct.

[Table 2 about here]

As my model predicts, concrete events seem to produce stronger affective responses than abstract events which, in turn, leads to large predicted macroeconomic consequences. In addition, the affective response makes respondents slightly more certain about the correctness of their predictions.

## 4.2 Framing effects

Hypothesis 2 says that affective responses can also be triggered by the way how the information is presented. Accordingly, the respondents in the treatment group are expected to make more negative predictions than those in the control group because of the negative affective cues.

Table 3 contains the mean predictions of the control group and of the treatment group. Seven variables are predicted differently at an error level of 10 percent. For  $GDP_{oil}$ ,  $UR_{euro}$ ,  $UR_{bases}$ ,  $DAX_{euro}$ , and  $DAX_{plant}$  the affective paragraph had the expected negative influence on the predicted outcome. However, for  $GDP_{plant}$  and  $Sales_{bases}$ , the affective cues did not reinforce the prediction, but alleviate it. In both cases, the affective paragraphs contained calls of negatively affected stakeholders to rethink the announced plans which may have conveyed the impression that the measures actually taken will be less severe than the announced ones.

[Table 3 about here]

As Table 4 shows, the affective information indeed makes the respondents in the treatment group more certain than the respondents in the control group. Although the expected effect shows up only in three cases, there is no evidence rejecting Hypothesis 2.

[Table 4 about here]

As intended, the affective cues produced more negative predictions in two of the five texts. In two texts (tax reform and terrorist attack) there was no overall effect. The text about the tax reform is easy to understand even without much theoretical reasoning so that additional affective information might not appear helpful to work out the economic consequences. The terrorist attack may be so vivid that the additional affective cues do not change much. The results show that affective responses are not only provoked by the event itself, but can also be triggered by the framing of the news report.

### 4.3 Knowledge and theoretical background

If Hypothesis 3 is true, business students will have stronger affective responses than econ students (under the assumption that econ students have more rele-

vant economic knowledge). Economic knowledge is useful in two ways: it helps to distinguish macroeconomically significant from insignificant events and it helps to figure out the events' consequences on the individual variables. I expect that economics students predict the economic events to have larger consequences. The business students will be guided more by their affective responses which will be especially strong after the concrete events.

In Table 5, both the macroeconomically significant events (euro depreciation, tax reform, terrorist attack) and the insignificant ones (oil pollution, plant relocation, closure of military bases) are grouped. I calculated the group mean absolute predictions and the group mean levels of certainty in order to compare the magnitudes between the two groups of events. Business students on average do not predict the economic events to have larger effects than the noneconomic ones. Only the economic events' effects on inflation and the stock market are larger than the effects of the other events. With respect to the unemployment rate and sales, business students expect the economically insignificant events to have a much larger effect than the economically significant ones. In contrast, econ students clearly identify the economic events to have much stronger consequences for GDP and the stock market. The level of certainty is only different in one case: business students are more certain about the unemployment consequences of the noneconomic events. In sum, there is evidence that those students with presumably less economic knowledge overestimate the significance of the noneconomic events whereas the more knowledgeable students make more realistic predictions.

**[Table 5 about here]**

In order to understand better how cognitive analysis and affective response as functions of knowledge and affective cues interact, we can look at the detailed findings in Table 6. Notice first that in both groups economics students



predict larger consequences of the terrorist attack than business students do. Second, the affective framing does not lead to different predictions of the tax reform and of the terrorist attack.

The most interesting events are the euro depreciation and the oil pollution. With respect to its consequences on GDP the euro depreciation is seen to have a large positive effect by econ students, but not by business students in the control group. The affective cues influence only business students' predictions of the unemployment rate and the DAX. Econ students are never affected suggesting that, indeed, econ students analyze this event cognitively based on their theoretical knowledge while business students generate their predictions intuitively.

The oil pollution is like a mirror image of the euro depreciation. The econ students expect a much smaller impact on GDP (control group) and on sales (treatment group), in contrast to the business students for whom the oil pollution has the largest effect on GDP and sales of all events. Interestingly, the affective framing only influences the predictions of the econ students. It seems that in the case of the noneconomic events, economic knowledge only helps to classify them as noneconomic up to a certain point. If the affective information becomes too salient, even people with more economic knowledge experience strong affective responses.

Most of the other significant differences are plausible: economics students (in the treatment group) predict a stronger effect of the tax reform on unemployment than business students and a negative effect on sales. In addition they predict a large positive effect of the plant relocation on the stock market and no effect of the closure of military bases on GDP.

**[Table 6 about here]**

In total, students with more economic knowledge tend to predict larger

effects of the economic events and smaller of the noneconomic ones, while students with less theoretical background do not clearly distinguish between macroeconomically significant and insignificant events. Additional affective cues influence business and econ students equally often but with respect to different events. In the texts about the economic event, the affective cues only influence business students, whereas they more often affect the econ students in the texts about the noneconomic events. This implies that theoretical knowledge about the economy helps to suppress affective responses when the theory fits to the events, but not if it is not relevant.

A second group which might have particular economic knowledge are foreign students. They might be able to assess the consequences of exchange rate movements better than native students. Concerning national events, it might be more difficult for them to estimate the magnitude of effects.

Table 7 reveals that foreign students indeed evaluate the depreciation of the euro more in line with the textbook models than natives. With respect to the national events, there are no strong differences between natives and foreigners. The most outstanding difference is that foreigners predict the plant relocation to have a much larger effect on GDP than natives, which seems unrealistic. Notice that foreign students in the treatment group make different predictions than those in the control group in nine cases compared to five differences among natives. Foreign students seem to lack necessary knowledge to assess the national events so that they more strongly rely on the affective response. Consequently, they are more often influenced by additional affective cues than natives. It is also remarkable that two predictions of foreigners related to the depreciation differ between the treatment and the control group. Although they presumably know more about exchange rate effects, they are not immune against affective cues suggesting that there is a difference between theoretical knowledge and experiential knowledge. In the

case of the theoretically most difficult economic event (euro depreciation), economics students (with theoretical knowledge) do not react to affective cues, whereas foreigners (with experiential knowledge) do. Cognitive analysis based on experiential knowledge might thus be less robust against affective responses than cognitive analysis based on theory.

[Table 7 about here]

#### 4.4 Internal conflict

An internal conflict will most likely arise within economics students whose cognitive analysis might be the most sophisticated. If they experience an internal conflict and if the affective response dominates the cognitive analysis, then there will be significant differences between economics students' predictions and levels of certainty between the treatment and the control group. Table 6 already showed that this is the case for the predictions concerning the noneconomic events. Table 8 demonstrates that in addition economics students' certainty is much lower in the treatment group than in the control group in 14 cases. Even for the economic events, where the size of the predictions were not significantly different between the two groups, the levels of certainty differ strongly.

The high degrees of certainty among the economics students in the control group suggests that these students did not only guess their predictions intuitively but rather performed some cognitive analysis. In the treatment group the econ students seem to be puzzled by the affective cues which do not fit to their theoretical model. They probably experience an affective response contradicting the results of their cognitive analysis. In some cases, this response is so strong that it influences the predictions, in others it makes the respondents more uncertain. They seem to know that they should ignore the information, since it does not help to make economic predictions, but seem

unable to suppress their affective response.

In all six cases in which there is a difference among business students, the affective information *increases* the certainty of the business students. In the control group, the business students seem to be aware of their lacking economic expertise and are generally much less certain than the economics students. In the treatment group, business students interpret the additional affective cues as reliable information and trust their affective responses. Since they do not perform a deep cognitive analysis, the credibility of the affective response is not weakened by contrasting cognitive results.

**[Table 8 about here]**

The result that respondents with less relevant knowledge interpret affective information as valuable is confirmed by foreigners' responses to the affective paragraphs in Table 9<sup>6</sup>. In six out of nine cases, their certainty is higher in the treatment group. Two of the other cases belong to the text about the military bases, for which the affective information could be interpreted as positive instead of negative. Then the affective cues could lead to a conflict between the cognitive analysis and the affective response.

**[Table 9 about here]**

The hypothesis that in case of conflict, the affective response overrules the cognitive analysis is strongly supported by those cases in which economics students and foreigners in the treatment group had lower confidence in their predictions than those in the control group and at the same time make significantly different predictions. Economics students were negatively influenced by the affective cues in  $GDP_{oil}$ ,  $UR_{oil}$ ,  $DAX_{plant}$ , and  $GDP_{bases}$ . In all these

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<sup>6</sup>Among natives, there are no differences between the control and the treatment group.

cases certainty is also lower in the treatment group<sup>7</sup>. The same is true for the foreigners with  $UR_{bases}$ .

## 5 Conclusions

Three questions motivated this study: 1. Which kinds of news do people consider to be relevant for the macroeconomy? 2. Do people react to economically irrelevant cues? 3. What role does economic knowledge play? The evidence presented suggests that lay people's expectations may deviate from rational expectations for two reasons. First, their expectations might be biased since they seem to underestimate economically large events. Second, they possibly believe economically irrelevant events to have macroeconomic effects. Especially emotionally interesting and salient news can trigger strong affective responses which weaken or even overrule the results of rational reasoning. This study shows that the participants believed that probably noneconomic events influence macroeconomic variables, in some cases even more strongly than economic events. The participants did not recognize that some events are simply too small to have any macroeconomic impact.

Why the participants ascribe macroeconomic impact to these small events can be explained by the abstract nature of the macroeconomy. The macroeconomy is described by aggregate variables which are difficult to understand and to imagine. Some of these variables have orders of magnitude much larger than the average consumer is accustomed to. As documented in Nisbett et al. (1982), lay people tend to ignore abstract information and base their inferences and action tendencies on logically much weaker, but emotionally more interesting information. Nisbett and his coauthors "speculate that concrete, emotionally interesting information has greater power to generate inferences because of the likelihood of such information's calling up 'scripts'

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<sup>7</sup>Although not statistically significant in the case of  $GDP_{oil}$ .

or schemas involving similar information. The inference then proceeds along the well-worn lines of the previously existing scripts. Abstract information is probably less rich in potential connections to the associative network by which scripts can be reached" (Nisbett et al. 1982, p. 112). From this perspective it is not surprising that people predict emotionally salient events to have relatively large effects on GDP and national unemployment.

The answer to the second question is yes: The participants of my study reacted to economically irrelevant cues. A simple additional paragraph with some affective cues produced significantly different predictions between the treatment and the control group. I speculate that the use of different media frames, including different headlines and different introductions, would have produced even stronger differences in the predictions. An explicit evaluation of the event, which might strongly influence readers' expectations, was absent in my texts.

Finally, knowledge about the economy makes people less susceptible to affective reactions. However, this only seems to be the case for theoretical, but not for experiential knowledge. Even students with more knowledge of economic theory were not completely immune against the framing effects. The affective cues influenced their predictions, when economic theory was not particularly helpful to analyze the event, and shattered their confidence even when the event could be analyzed with economic theories they knew. Students with less theoretical background probably produced more intuitive predictions and interpreted additional affective cues as helpful information. It is important to remember that all participants had economic background. With real lay people the findings might even be stronger.

What do these results mean? I interpret my findings as supportive evidence for what many business economists outside academia and some academic economists believe: there exist events with little direct impact on the

economy but which may have severe mid-term consequences via their impact on consumer or business confidence. On July 7, 2005, the day of the terrorist attacks in London, Kenneth Rogoff and several chief economists of large banks expected the attack to shaken consumer confidence despite its minor direct impact on the U.K. economy (see Fraher 2005). I find that other events with possibly even less direct economic impact than a terrorist attack may also affect consumer expectations provided that they are emotionally salient and affectively framed in the news. It may be a bit of a stretch to claim that single salient events, can drive an economy with strong fundamentals into a recession. However, they may be able to tilt a stagnating economy into a recession, especially if uncertainty is high and consumers are already concerned.

This study is a first step into the exploration of how economic expectations of lay people are formed. If we know more about the actual formation of expectations, we may not forever be ignorant to the true shocks that drive economic fluctuations.

## **Appendix**

### **A1: Description of participants**

[Table 10 here]

### **A2: Summary of reports**

After the summary, I present some arguments about the likely economic impact.

**Depreciation of the euro** The text states that the dollar appreciated against the euro by 15% within a few weeks. Two reasons are mentioned: extraordinarily good business conditions in the U.S. and rumors about a potential bank crash in Italy. The text also mentions that the European Central

bank denies any danger for the European financial system and considers the behavior of some investors as an overreaction to unsupported rumors.

In the affective paragraph, the Italian Prime Minister is cited accusing his political opponents to spread rumors in order to shatter confidence into the Italian government and the euro. The weakening of the euro were only the result of unscrupulous financial speculation by international speculators.

Referring to the macroeconomic model of the Bundesbank, the German council of economic advisers estimates that a sudden and lasting depreciation of the dollar against the euro by 10% reduces the German GDP by 0.2% in the first year (Sachverständigenrat 2002, No. 330) Assuming that the effect is symmetric an appreciation of the dollar by 15% might increase GDP by 0.3%, which is considerable given the currently low growth rates in Germany (2002: 0.2%, 2003: 0.0%, 2004: 1.6%).

**Tax reform** The ruling party and the opposition agreed to reform the tax system radically. In six months, the total tax burden of households will be lowered by € 30b which is twice the amount of a previous tax reform. This will be financed by a combination of a rise of the VAT by one percentage point, a cut in subsidies, and a larger budget deficit. Most politicians agree with the tax cuts, because they will increase consumers' willingness to spend and decrease labor costs. Both will lead to higher growth and employment. However, some socialist representatives voted against the law, since it will favor the rich and discriminate against the poor.

The affective cues are meant to trigger thoughts of fairness and a feeling of injustice. Other representatives associated with labor unions and churches also stressed the harmful effects on the weakest members of society such as unemployed and pensioners.

Such a tax reform would probably have macroeconomic effects. The council of economic advisors estimated in 2003 that the adoption of a discussed



tax reform in 2004, reducing the tax burden by EUR 15b gross and EUR 4b net, would raise the GDP in 2004 by 0.2% (Sachverständigenrat 2003, No. 384). Since my text reports a *net* reduction of € 30b, one might expect a total effect on GDP of +1.4%. Since in the text, the tax reform will be effective after six months, but the forecast horizon is three months, the prediction might be lower. However, due to anticipation effects, the effect should still be economically significant.

**Terrorist attack in Frankfurt** A truck loaded with explosives detonated in front of the Deutsche Bank headquarter in Frankfurt, the German banking center, the day before. 53 persons died and more than 400 were injured. The buildings of Deutsche Bank and other banks in the neighborhood were severely damaged. The government suspects Islamic fundamentalists to be responsible and fears further attacks in Frankfurt and other cities. Many facilities such as the European Central Bank, the Bundesbank, and the German stock exchange, were evacuated and are watched by security forces. Business will be taken up there the next day.

The affective cues (horrifying, New York World Trade Center, September 11, debris, panic, horrible, terrible fear of further attacks) were expected to intensify the feelings of threat.

A Report for Congress (2002) concludes that the short-run effects of 9/11 on the U.S. economy were limited, although this might be due to timely and appropriate action by the Federal Reserve and other central banks. Accordingly, the effects of a terrorist attack in Frankfurt, with less severe immediate consequences, might have practically no direct impact on the German economy. Nevertheless, effects on the stock market are most likely and also possible for consumer confidence.

**Oil pollution** After the collision of an oil-tanker with another ship a large oil slick drifts towards the German seashore. The oil slick has already pol-

luted some part of the coast and threatens to pollute a region which strongly depends on tourism. Furthermore, the oil slick blocks the only German deep water harbor which might lead to a shortage of oil if shipping traffic is abandoned for a longer time.

In the affective paragraph the environmental harms of the oil spill are emphasized mentioning oil-contaminated seabirds and that the affected region is a unique ecosystem supposed to become a UNESCO world natural heritage. Obviously, the affective cues might trigger images of earlier oil pollutions seen on TV.

It seems unlikely that an oil pollution in the affected region have any significant effect on Germany for two reasons. First, with only about one percent of Germany's population and GDP, the region is too small to matter much<sup>8</sup>. Second, the oil shortage mentioned in the text is unlikely to happen, since it seems implausible that public authorities would forbid oil tankers to enter port due to an oil slick, if a shortage of oil threatens.

**Relocation of plant** DaimlerChrysler announces to relocate Europe's largest assembly plant for trucks from Germany to Slovakia next year. The plant relocation affects 12,000 workers directly and many others in other firms indirectly. The city of Wörth with 19,000 inhabitants, where the plant is currently located, will lose almost all of its industrial jobs. The workers' council and the city's mayor announced to fight fiercely for the jobs.

The affective paragraph cites the chairman of the workers' council calling upon the management to negotiate and to rethink their plans. Unfair distortions of competition by dumping wages would destroy German livelihoods and do big damage to the German economy. I expect them to make people

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<sup>8</sup>In 1999, the region's two sectors *agriculture and fishery*, and *trade, services and transportation*, which are most likely to be affected, accounted for only 0.2 percent of Germany's gross value added. This figure overstates the potential effects, because the region (Ostfriesland) is broadly defined (all nine coastal districts between Leer and Cuxhaven) and the sectors contain industries which are probably not affected by the accident.

think about fairness and to feel threatened by international competition.

Even if all 12,000 workers were made redundant, which is unlikely, this would have changed the German unemployment rate of May 2005 only at the second digit after the decimal point, which is not reported in the official unemployment rate.

**Closure of military bases** The Department of Defense announced to close down 103 military bases until the end of the following year, because it is planned to reduce the army from 260,000 to 200,000 soldiers. 20,000 civil employees will be affected. Especially smaller bases in depressed regions in Northern and Eastern Germany will be closed. Due to enhanced efficiency, € 200 million will be saved annually. The plan hits small towns hard, since in many of them the army is the largest employer. In addition, tax revenues and retail sales in those towns depend heavily on the income of soldiers and civil employees.

The affective cues (irresponsible, to destroy livelihoods, disadvantaged rural regions, unemployment larger than any socially acceptable level, massive social cutbacks) are meant to appeal to feelings of fairness.

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## Tables

		Abstract events			Concrete events		
		Euro depr.	Tax reform	Military bases	Oil pollution	Terrorist attack	Plant relocation
GDP	Mean	.454	1.248	-.547	-1.325	-1.085	-1.000
	p	.002	<.001	<.001	<.001	<.001	<.001
	Stdd	1.669	1.432	1.148	1.180	1.263	1.266
	Certainty	57.46	58.48	58.21	62.42	59.83	62.84
UR	Mean	.179	-.716	.974	.759	.068	1.233
	p	.070	<.001	<.001	<.001	.224	<.001
	Stdd	1.304	1.508	1.729	1.355	.971	1.711
	Certainty	61.42	61.99	70.66	62.57	59.16	75.62
IR	Mean	.966	.569	.095	.522	.431	.043
	p	<.001	<.001	.055	<.001	<.001	.269
	Stdd	1.487	1.232	.632	1.273	1.225	.751
	Certainty	52.66	54.20	54.51	57.64	52.50	56.78
Sales	Mean	-.111	.812	-1.241	-1.370	-.983	-.957
	p	.229	<.001	<.001	<.001	<.001	<.001
	Stdd	1.612	1.929	1.139	1.483	1.722	1.241
	Certainty	56.15	64.32	67.52	63.23	64.29	64.74
DAX	Mean	-.658	.914	-.371	-1.172	-2.862	-.026
	p	<.001	<.001	<.001	<.001	<.001	.439
	Stdd	2.081	1.541	.850	1.280	1.532	1.803
	Certainty	53.54	49.91	51.50	57.52	70.46	58.47

**Table 1:** Abstract vs. concrete events; p: empirical significance level of mean test against zero

	Prediction			Certainty		
	Abstract	Concrete	p	Abstract	Concrete	p
GDP	<b>.749</b>	<b>1.137</b>	<b>&lt;.001</b>	<b>58.12</b>	<b>61.82</b>	<b>.096</b>
UR	.621	.684	.31	64.80	65.83	.35
IR	<b>.543</b>	<b>.345</b>	<b>.019</b>	53.78	55.69	.276
Sales	<b>.727</b>	<b>1.101</b>	<b>.002</b>	62.54	64.12	.287
DAX	<b>.643</b>	<b>1.359</b>	<b>&lt;.001</b>	<b>51.62</b>	<b>62.18</b>	<b>&lt;.001</b>

**Table 2:** Average magnitude of predictions and average degree of certainty of abstract and concrete events

	Mean	Euro depr.	Oil pollution	Tax reform	Plant relocation	Military bases	Terrorist attack
GDP	control	.414	<b>-1.155</b>	1.207	<b>-1.172</b>	-.534	-1.155
	treatment	.492	<b>-1.492</b>	1.288	<b>-.831</b>	-.559	-1.017
	p	.401	<b>.062</b>	.380	<b>.073</b>	.454	.278
UR	control	<b>-.138</b>	.741	-.614	1.190	<b>.621</b>	.069
	treatment	<b>.492</b>	.776	-.814	1.276	<b>1.322</b>	.068
	p	<b>.004</b>	.446	.239	.394	<b>.014</b>	.497
IR	control	.877	.596	.684	.070	.140	.456
	treatment	1.051	.448	.458	.017	.051	.407
	p	.267	.267	.162	.351	.225	.415
Sales	control	-.259	-1.379	.759	-1.051	<b>-1.414</b>	-1.069
	treatment	.034	-1.362	.864	-.864	<b>-1.069</b>	.898
	p	.164	.475	.384	.208	<b>.052</b>	.297
DAX	control	<b>-.276</b>	-1.207	1.018	<b>.241</b>	-.328	-2.914
	treatment	<b>-1.033</b>	-1.138	.814	<b>-.288</b>	-.414	-2.810
	p	<b>0.024</b>	.387	.239	<b>.056</b>	.294	.359

**Table 3:** Affective framing; bold figures: significant difference between group means at an error level of 10 percent



	∅ Certainty	Euro depr.	Oil pollution	Tax reform	Plant relocation	Military bases	Terrorist attack
GDP	control	55.98	63.23	56.07	<b>59.46</b>	57.82	61
	treatment	58.88	61.64	60.81	<b>66.10</b>	58.59	58.72
	p	.285	.368	.160	<b>.084</b>	.442	.332
UR	control	61.52	61.88	59.63	74.73	70.27	61.36
	treatment	61.31	63.25	64.22	76.46	71.03	57.07
	p	.485	.394	.169	.336	.435	.206
IR	control	51.09	56.18	54.55	54.91	55.28	53.24
	treatment	54.14	59.05	53.88	58.53	53.79	51.81
	p	.284	.301	.452	.267	.403	.396
Sales	control	57.41	62.32	65.73	65.80	68.27	66.36
	treatment	54.91	64.12	62.98	63.71	66.81	62.32
	p	.326	.360	.272	.338	.378	.185
DAX	control	<b>49.02</b>	58.48	<b>45.98</b>	55.71	55.18	68.16
	treatment	<b>57.98</b>	56.58	<b>53.71</b>	61.12	48.02	72.64
	p	<b>.057</b>	.354	<b>.091</b>	.168	.118	.206

**Table 4:** Effects on certainty; bold figures: significant difference between group means at an error level of 10 percent

		Prediction			Certainty		
		event economically			event economically		
		significant	insignificant	p	significant	insignificant	p
Business students	GDP	.886	.981	.202	57.59	60.58	.163
	UR	<b>.25</b>	<b>.955</b>	<b>&lt;.001</b>	<b>60.47</b>	<b>69.67</b>	<b>.001</b>
	IR	<b>.625</b>	<b>.191</b>	<b>&lt;.001</b>	52.49	56.12	.151
	Sales	<b>.613</b>	<b>1.208</b>	<b>&lt;.001</b>	61.44	65.21	.106
	DAX	<b>1.433</b>	<b>.561</b>	<b>&lt;.001</b>	57.20	55.38	.302
Econ students	GDP	<b>1.233</b>	<b>.633</b>	<b>.043</b>	65	66.66	.427
	UR	1	1.37	.183	65.19	69.81	.333
	IR	.833	.467	.167	57.78	60.37	.407
	Sales	.733	1.111	.144	63.52	68.52	.310
	DAX	<b>1.815</b>	<b>.111</b>	<b>&lt;.001</b>	63.30	64.26	.467

**Table 5:** Average magnitude of predictions and average degree of certainty of economic and noneconomic events; bold figures: significant difference between group means at an error level of 10 percent

Macroeconomically		significant			insignificant		
Mean prediction		Euro depr.	Tax reform	Terrorist attack	Oil pollution	Plant relocation	Military bases
GDP	Business, control	<b>.294</b>	1.216	-1.059	<b>-1.275</b>	-1.196	<b>-.569</b>
	Econ, control	<b>1.4</b>	1.0	-1.6	<b>.2</b>	-.8	<b>0</b>
	p	<b>.048</b>	.338	.181	<b>.018</b>	.186	<b>&lt;.001</b>
	Business, treatm.	.463	1.315	-.963	-1.481	-.833*	-.537
	Econ, treatm.	.8	1.0	-1.6	-1.6**	-.8	-.8**
	p	.361	.344	.204	.397	.485	.273
UR	Business, control	-.196	-.54	<b>-.078</b>	.765	1.176	<b>.510</b>
	Econ, control	.4	-1	<b>1.2</b>	.6	1.2	<b>1.4</b>
	p	.161	.320	<b>.046</b>	.306	.484	<b>.011</b>
	Business, treatm.	.481***	<b>-.704</b>	<b>0</b>	<b>.736</b>	1.222	1.296**
	Econ, treatm.	.6	<b>-2</b>	<b>.8</b>	<b>1.2**</b>	2.0	1.6
	p	.436	<b>.099</b>	<b>.09</b>	<b>.06</b>	.179	.345
IR	Business, control	.88	.68	<b>.34</b>	<b>.38</b>	.06	.14
	Econ, control	.8	.4	<b>1.2</b>	<b>2.0</b>	.2	.2
	p	.428	.401	<b>.042</b>	<b>.063</b>	.272	.398
	Business, treatm.	1.019	.463	.370	.509	-.019	.037
	Econ, treatm.	1.4	.4	.8	-.2**	.4	.2
	p	.308	.466	.256	.198	.183	.242
Sales	Business, control	-.196	.843	<b>-.922</b>	-1.431	-1.078	-1.431
	Econ, control	-.8	-.2	<b>-2</b>	-1	-1	-1.2
	p	.189	.268	<b>.084</b>	.32	.448	.295
	Business, treatm.	.074	<b>.981</b>	<b>-.815</b>	<b>-1.415</b>	-.833	-1.074*
	Econ, treatm.	-.4	<b>-.4</b>	<b>-1.8</b>	<b>-.8</b>	-1.2	-1
	p	.214	<b>.084</b>	<b>.088</b>	<b>.100</b>	.206	.437
DAX	Business, control	-.275	.9	<b>-2.745</b>	-1.137	<b>.039</b>	-.353
	Econ, control	0	1.8	<b>-4.2</b>	-1.6	<b>2.4</b>	-.2
	p	.367	.205	<b>.032</b>	.217	<b>.001</b>	.267
	Business, treatm.	-1.111**	.833	-2.759	-1.076	-.370	-.444
	Econ, treatm.	-.2	.6	-3.5	-1.8	.6**	0
	p	.166	.409	.171	.11	.137	.181

**Table 6:** Affective framing: business versus economics students; bold figures: significant difference between group means at an error level of 10 percent; asterisks indicate a statistically significant difference between the treatment group and the control group: \* 10 percent, \*\* 5 percent, \*\*\* 1 percent error probability

		International	National				
Mean prediction		Euro depr.	Oil pollution	Tax reform	Plant relocation	Military bases	Terrorist attack
GDP	Native, control	.364	-1.068	1.205	<b>-.886</b>	<b>-.727</b>	-1.159
	Foreign, control	.5833	-1.417	1.083	<b>-2.083</b>	<b>.333</b>	-1.348
	p	.321	.218	.42	<b>.003</b>	<b>.007</b>	.346
	Native, treatm.	<b>.302</b>	-1.58**	1.302	-.721	-.558	-1.070
	Foreign, treatm.	<b>1.0</b>	-1.25	1.25	-1.125**	-.563**	-.875
	p	<b>.085</b>	.137	.449	.186	.495	.288
UR	Native, control	<b>.184</b>	.682	-.682	1.205	.773	.159
	Foreign, control	<b>-.75</b>	1.0	-.091	.917	-.083	-.417
	p	<b>.071</b>	.30	.129	.373	.15	.056
	Native, treatm.	.442**	.667	-.860	1.349	1.302**	.163
	Foreign, treatm.	.625**	1.063	-.688	1.067	1.375*	-.188
	p	.331	.17	.367	.318	.451	.146
IR	Native, control	1.022	.636	.75	0	.114	<b>.705</b>
	Foreign, control	.455	.364	.364	.273	.455	<b>-.636</b>
	p	.107	.284	.806	.218	.133	<b>.005</b>
	Native, treatm.	<b>.814</b>	.524	.535	<b>-.140</b>	<b>-.047**</b>	.419
	Foreign, treatm.	<b>1.688**</b>	.25	.25	<b>.438</b>	<b>.313</b>	.375**
	p	<b>.030</b>	.191	.216	<b>.039</b>	<b>.039</b>	.441
Sales	Native, control	-.432	-1.273	.818	-.932	-1.477	-1.068
	Foreign, control	.333	-1.75	.583	-1.333	-1.0	-.917
	p	.128	.185	.35	.207	.124	.402
	Native, treatm.	.023*	-1.476	.930	<b>-1.162</b>	<b>-1.233</b>	-.884
	Foreign, treatm.	.063	-1.063	.687	<b>-.063*</b>	<b>-.6</b>	-.938
	p	.473	.206	.313	<b>.015</b>	<b>.049</b>	.455
DAX	Native, control	-.364	-1.136	<b>1.182</b>	<b>.455</b>	-.318	<b>-3.068</b>
	Foreign, control	-.167	-1.333	<b>.364</b>	<b>-.5</b>	-.167	<b>-2.417</b>
	p	.386	.352	<b>.055</b>	<b>.051</b>	.339	<b>.074</b>
	Native, treatm.	<b>-1.279**</b>	-1.238	.907	<b>-.465***</b>	-.442	<b>-2.977</b>
	Foreign, treatm.	<b>-.375</b>	-.875	.563	<b>.188</b>	-.333	<b>-2.333</b>
	p	<b>.074</b>	.133	.185	<b>.093</b>	.335	<b>.069</b>

**Table 7:** Affective framing: foreigners versus natives; bold figures: significant difference between group means at an error level of 10 percent; asterisks indicate a statistically significant difference between the treatment group and the control group: \* 10 percent, \*\* 5 percent, \*\*\* 1 percent error probability

Macroeconomically			significant			insignificant		
	Certainty	Euro depr.	Tax reform	Terrorist attack	Oil pollution	Plant relocation	Military bases	
Business students	GDP	Control	53.88	<b>54.18</b>	58.54	61.65	<b>57.24</b>	55.84
		Treatment	59.17	<b>61.61</b>	59.19	62.04	<b>66.56</b>	59.5
		p	.168	<b>.073</b>	.455	.470	<b>.035</b>	.263
	UR	Control	61.63	58.75	60.42	60.20	73.06	68.96
		Treatment	61.23	64.72	57.22	65	77.31	71.85
		p	.472	.118	.285	.19	.16	.281
	IR	Control	48.65	53.02	51.81	53.85	<b>52.29</b>	52.02
		Treatment	55.09	55.19	52.5	61.06	<b>60.28</b>	54.72
		p	.128	.355	.452	.111	<b>.102</b>	.339
	Sales	Control	56.94	64.48	64.79	62.45	63.88	66.77
		Treatment	55.28	63.94	63.61	65.19	63.79	67.41
		p	.391	.454	.404	.308	.494	.449
DAX	Control	<b>46.53</b>	45.71	<b>64.79</b>	56.94	<b>52.86</b>	52.81	
	Treatment	<b>59.15</b>	55.09	<b>73.02</b>	56.98	<b>61.67</b>	48.61	
	p	<b>.017</b>	.061	<b>.081</b>	.497	<b>.072</b>	.260	
Econ students	GDP	Control	73	71	<b>81</b>	76	77	<b>77</b>
		Treatment	55	50	<b>52.5</b>	56.25	60	<b>46.25</b>
		p	.126	.117	<b>.038</b>	.168	.175	<b>.093</b>
	UR	Control	63	74	75	<b>79</b>	85	81
		Treatment	62.5	57.5	55	<b>40</b>	65	60
		p	.484	.229	.122	<b>.008</b>	.187	.137
	IR	Control	69	<b>75</b>	<b>72</b>	<b>79</b>	<b>78</b>	<b>82</b>
		Treatment	41.25	<b>36.25</b>	<b>42.5</b>	<b>32.5</b>	<b>35</b>	<b>41.25</b>
		p	.123	<b>.018</b>	<b>.055</b>	<b>.002</b>	<b>.003</b>	<b>.008</b>
	Sales	Control	<b>73</b>	74	<b>80</b>	66	85	82
		Treatment	<b>50</b>	50	<b>45</b>	50	62.5	58.75
		p	<b>.028</b>	.169	<b>.011</b>	.151	.140	.125
DAX	Control	<b>81</b>	53	91.8	<b>81</b>	<b>78</b>	<b>72</b>	
	Treatment	<b>42.5</b>	35	67.5	<b>51.25</b>	<b>53.75</b>	<b>40</b>	
	p	<b>.034</b>	.229	.121	<b>.063</b>	<b>.091</b>	<b>.039</b>	

**Table 8:** Effects on certainty, business students versus econ students; bold figures: significant difference between group means at an error level of 10 percent

Macroeconomically		significant			insignificant		
		Euro depr.	Tax reform	Terrorist attack	Oil pollution	Plant relocation	Military bases
GDP	Control	<b>57</b>	57.5	60	62.6	<b>54</b>	59.5
	Treatment	<b>78</b>	70	61.73	67.33	<b>72</b>	61.87
	p	<b>.042</b>	.125	.436	.351	<b>.046</b>	.422
UR	Control	78	<b>54.44</b>	65	66	86	<b>84</b>
	Treatment	74.33	<b>74</b>	55.33	65.67	79.67	<b>69.33</b>
	p	.316	<b>.075</b>	.221	.488	.127	<b>.058</b>
IR	Control	<b>47.78</b>	<b>49.67</b>	60	51.11	52.78	57.22
	Treatment	<b>72.33</b>	<b>64.67</b>	54	64.67	67.33	62.33
	p	<b>.030</b>	<b>.061</b>	.293	.169	.139	.333
Sales	Control	60	60	63	71	68	65
	Treatment	66.67	54.67	56	55.67	61.33	63.33
	p	.251	.294	.239	.102	.247	.431
DAX	Control	56	40	63	64	<b>39</b>	<b>54</b>
	Treatment	63.33	51.33	70.67	56.67	<b>60.67</b>	<b>38.67</b>
	p	.260	.176	.267	.218	<b>.019</b>	<b>.066</b>

**Table 9:** Effects on certainty, natives versus foreigners; bold figures: significant difference between group means at an error level of 10 percent

male	female	native	foreign	business	econ	control	treatment
59	57	87	28	105	10	58	59
50.9%	49.1%	75.6%	24.4%	91.3%	8.7%	49.6%	50.4%

**Table 10:** Summary statistics of participants