
RISK TAKING AND ECONOMIC OUTCOMES:
THE ROLE OF SOCIAL CONTEXT

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INTRODUCTION

Nearly all important economic decisions in real life like investments or educational decisions involve various risks. Therefore, risky choice behavior is a major determinant of economic outcomes and ultimately well-being. Standard economic theory relies on expected utility where risky decisions are solely determined by the own state-dependent payoffs of the decision maker and their corresponding probabilities. Empirical research has, however, shown that risk preferences are heavily influenced by the context inherent to the choice problem, for example framing effects, the presence of irrelevant alternatives or past experiences. This leads to systematic deviations from the choices that would be consistent with the conventional definition of rationality (Kahneman & Tversky, 2000). Factors that have been shown to influence risk taking are for example sleep deprivation (e.g. Venkatraman et al., 2011), mood and emotional state, like fear or anger (e.g. Raghunathan & Pham, 1999; Lerner & Keltner, 2001) or the level of stress (e.g. Bault et al., 2008; Porcelli & Delgado, 2009). In addition, many individual decisions under risk are taken in a social environment, therefore, the social context may be an important factor when evaluating choices. However, only in recent years the interest to study the influence of the social context on decisions under risk has been growing among economists. In this regard, for example the mere presence of peers has been shown to affect time and risk preferences (Wilson & Daly, 2004; Ermer et al., 2008; Hill & Buss, 2010; Linde & Sonnemans, 2012).

In my thesis I analyze risk taking and resulting economic outcomes in different settings with a particular focus on the social context. Thereby, I contribute to answering the question whether and how the social context influences preferences and thereby economic outcomes. My thesis consists of two parts. The first part, composed of two papers (papers one and two), addresses economic consequences in an environment where risk taking is inherent – the gambling market. Existing regulations are discussed from an economic perspective and possible new regulations are proposed. It, therefore, provides new insights and arguments on the debate on the optimal regulation of gambling, which directly affects economic outcomes. On the aggregate level it has implications in form of tax revenues and on the individual level for example in the context of problem gambling.

The second part of my thesis is composed of three papers that address risk taking in experimental settings with a focus on the social context. In these three papers I use economic experiments to examine individual risk preferences in the presence of social comparison (third paper), risk preferences of groups compared to individuals (fourth paper) and the predictive

power of risk and time preferences as well as mindfulness for adolescents' field behavior (fifth paper). Studies three and four focus on decision making processes explicitly taking the social context into account and demonstrate that the social context has a significant influence on preferences. The fifth study examines the relation between preferences and personality traits and analyzes their influence on economic outcomes, including health and economic related behavior, such as smoking or saving, as well as subjective well-being.

Part I of the thesis

The first part of my thesis deals with the regulation of gambling in Germany. The motivation for the two papers included in this part was an intense debate about the re-regulation of the German gambling market. The background of this debate was the fact that the existing regulations had been declared incompatible with the European law by the EU court and were running out in 2011. The focus of the analysis lies on the economic consequences of the regulation, in particular the economic inefficiencies caused by the monopoly in place and the decreasing revenues in the gambling market due to major market changes as a result of increasing online-betting, a sector which was unregulated at that time.

In the first paper, *Der Glücksspielstaatsvertrag aus ökonomischer Perspektive*, my co-authors and I analyze the German sports betting market, as a branch of the gambling market, from an economic perspective and outline possible new regulations. The situation in Germany is described with regard to economic indicators, problem gambling and betting manipulation. In addition, the German betting market is compared to other European countries in light of the harmonization of the European market. A focus is drawn on online-betting, since it was not regulated at that time. Afterwards, possible regulation scenarios are compared and discussed, in particular different taxation schemes. One of the main conclusions of this first paper is that, in our view, a betting monopoly cannot be justified from an economic perspective. However, we acknowledge that there is a need for regulation, due to the negative effects of problem gambling and betting manipulation. A reasonable way for a new regulation would be a regulated opening of the market, which could, for example, be implemented by a licensing procedure. Future regulations should ensure that the share of wagers in the regulated market is as high as possible, which is particularly important for the relatively new and unregulated online-betting market. A tax on gross gaming revenues seems to be most suitable to achieve this goal. Finally, we suggest that, in order to minimize the negative impact of gambling, the regulation should be designed in a way that it can most effectively prevent betting manipulation and reduce problem gambling. This paper is joint work with Mario Maschke and Ulrich Schmidt and is published as: Lima de Miranda, K., Maschke, M., & Schmidt, U. (2012). *Der Glücksspielstaatsvertrag aus ökonomischer*

Perspektive. In Höfling, W., Horst, J., & Nolte, M. (Eds.), *Sportwetten in Deutschland* (pp. 9-24), Tübingen: Mohr Siebeck.

In 2012 the 16 German federal states eventually implemented new regulations on gambling. In January 2012 Schleswig-Holstein unilaterally implemented a new and relatively liberal regulation, the federal Gaming Amendment Act of Schleswig-Holstein (GAA), thereby deviating from the composite of the remaining 15 federal states. These passed new regulations called the German State Treaty on Gambling (GST), which entered into force in July 2012. These also liberalized the gambling market but to a lesser degree than Schleswig-Holstein.

This led to the second paper, ***Regulierung des Glücksspiels in Deutschland: Das Glücksspielgesetz Schleswig-Holsteins und der Glücksspieländerungsstaatsvertrag aus ökonomischer Perspektive***, in which my co-author and I compare the two new laws effective for the regulation of gambling in Germany at that time from an economic perspective. First, we derive two goals that should be pursued by the regulation of gambling – realization of tax revenues and the reduction of problem gambling. Channeling gambling into the regulated market is, in our view, a necessary condition to achieve both objectives. As the GAA can be expected to realize a higher degree of channeling due to more competitive tax rates as well as the inclusion of online poker and casinos, it appears to be overall superior to the GST. We note that it is in particular incomprehensible that online poker and online casinos are not included in the GST, since on one side they have a high potential for addiction and should thus be regulated and on the other side allow to generate higher tax revenues compared to sports betting for example. This paper is joint work with Ulrich Schmidt and is published as: Schmidt, U., & Lima de Miranda, K. (2013). Regulierung des Glücksspiels in Deutschland: Das Glücksspielgesetz Schleswig-Holsteins und der Glücksspieländerungsstaatsvertrag aus ökonomischer Perspektive. *Zeitschrift für Wirtschaftspolitik*, 62(1), 82-94. doi.org/10.1515/zfwp-2013-0108.

Part II of the thesis

In the second part of my thesis I address risk taking and economic outcomes in experimental settings with a focus on the social context. For the papers included in this part me and my co-authors designed and conducted experiments with subjects from the University of Kiel and high-schools in Schleswig-Holstein. Using the data generated by the experiment I examine individual risk preferences in the presence of social comparison (third paper), risk preferences of groups compared to individuals (fourth paper) and the predictive power of risk and time preferences as well as mindfulness for adolescents' field behavior (fifth paper).

In the third paper, ***Insurance Demand and Social Comparison: An experimental Analysis***, me and my co-authors analyze a major puzzle in insurance economics - the fact that people underinsure low-probability events with high losses. It is well documented that many people do not take up disaster insurance even though premiums are often subsidized (Kunreuther et al., 1978; Kunreuther & Pauly, 2004). A very prominent example for this type of behavior is flood insurance in the USA. At the same time, many people insure modest risks at highly loaded premiums, e.g. extended warranties, cell phone insurance or low deductibles for home insurance. In the paper we develop and test a new explanation for the low take-up of disaster insurance by analyzing whether social comparison can explain the insurance decision. We argue that risks in the case of disasters are highly correlated between subjects whereas risks for which high insurance take-up can be observed (e.g. extended warranties or cell phone insurance) are typically idiosyncratic. We set up a simple model with social reference points which builds on the model of Fehr and Schmidt (1999) and show that in the presence of inequality aversion social comparison makes insurance indeed less attractive if risks are correlated. To test our theoretical predictions, we conducted an experiment designed to observe insurance take-up in situations where risks were either idiosyncratic or correlated. In a classroom experiment with 149 students from the University of Kiel, subjects received an initial endowment and had the possibility to buy full insurance at varying premiums for a potential loss (50% chance) under two correlation schemes – correlated and uncorrelated. We find that the average willingness to pay for insurance is significantly higher for uncorrelated than for correlated risks. The experiment therefore confirms our theoretical predictions. This paper is joint work with Andreas Friedl and Ulrich Schmidt and is published as: Friedl, A., Lima de Miranda, K., & Schmidt, U. (2014). Insurance demand and social comparison: An experimental analysis. *Journal of Risk and Uncertainty*, 48(2), 97-109. doi:10.1007/s11166-014-9189-9.

Since the previous paper analyzes risk taking in the loss domain (possibility to buy insurance for a loss), my co-authors and I were intrigued to analyze how the risk correlation structure influences risk taking in the gain domain. We hypothesized that like in the loss domain risk taking is higher for positively correlated risks than for uncorrelated risks in the gain domain. In the resulting paper, ***Social Comparison and Gender Differences in Risk Taking***, (not part of this thesis due to regulation issues) we first develop a model of decision making under risk that depends both on the consumption value of outcomes as well as on a private and a social reference point. For this purpose, we build upon the model of Gamba and Manzoni (2014) and introduce a social reference point in the model of Köszegi and Rabin (2006, 2007) that depends on the payoffs of peers. Drawing on previous results from evolutionary biology, we hypothesize that men (women) focus more on relative (absolute) income, i.e., the relative weight of social gain-loss utility is higher for men than for women. Our model, therefore, predicts that risk taking

is higher (lower) for positively (negatively) correlated risks than for uncorrelated risks and that this effect is stronger for men than for women. We present two simple experiments that test the implications of our model. We use a two-step procedure: first we test the overall model with concurrent private and social reference points in a controlled lab environment. Afterwards, we enlarge the social context as we proceed to a classroom experiment. In both experiments, we compare individual risk taking for positively correlated risks with that of uncorrelated or negatively correlated ones. The predictions of our model are confirmed by the two experiments and we conclude that social comparison and the correlation of risks influence risk taking and may in particular play an important role in the discussion of gender differences in risk taking.

These two studies contribute to the growing evidence that risk taking behavior of individuals is influenced by personal characteristics, such as gender, and by the decision context –for example whether a decision is taken individually or within a group. In addition, the second study contributes to the controversy regarding gender differences in risk taking by investigating the impact of social comparison. Gender differences in risk taking on the individual level have been intensively discussed in the economics literature. The predominant finding is that women are more risk averse than men (e.g. Charness & Gneezy, 2012), although others argue that gender differences are small and context-specific (Schubert et al., 1999; Fillipin & Crosetto, 2014). In contrast to individual decisions, relatively little evidence exists on how the gender composition of a group influences its' risk taking. This is striking as many important economic decisions are made by groups of individuals (e.g. committees, boards, working groups, teams), and with the introduction of women quotas in many European countries, it is a highly publicly debated and important topic.

Since the early sixties it has been shown that groups often take higher risks than individuals (risky shift phenomenon). This result has been challenged by recent studies which predominantly observed cautious shifts when experimental designs with real monetary incentives are employed. In the fourth paper of my thesis, *The Risky Shift Phenomenon in Group Decisions: Does Gender Matter?*, my co-authors and I analyze to which extent the direction of the group shift depends on the gender composition of groups. Based on the “risk as value” hypothesis of Brown (1965) we propose a gender-specific polarization hypothesis which states that, compared to individual preferences, male dominated groups will shift towards higher risk taking than female dominated ones. We test this proposition with an experiment in which we elicited risk preferences of groups of three people with varying gender composition. Our experimental tests show that on average risk taking of a group increases with the number of male group members and reveal a systematic impact of gender composition on group shifts which supports our hypothesis. This currently unpublished manuscript is joint work with Lena Detlefsen and Ulrich Schmidt.

While the previous papers in this part of my thesis analyze sources of differences in risk preferences among individuals and groups, the last paper investigates how differences in preferences and personality influence behavior and economic outcomes. In the fifth paper of my thesis, ***Mindfulness, Preferences and Well-Being: Mindfulness Predicts Adolescents' Field Behavior***, I assess the relationship between mindfulness and economic preferences, and consequently well-being, of adolescents. Mindfulness could influence economic and health related behavior by bringing about increased and unbiased attention to the present moment, for example to a decision making process. Comprehensive data of 525 German secondary school students were elicited and show no evidence for a strong linear or non-linear correlation between mindfulness and economic preferences. However, both mindfulness and preferences have explanatory power for adolescents' field behavior and thus contribute to explaining variation in behavior that may translate into serious health and economic consequences. In this regard, my findings indicate that the two concepts play rather complementary than substitutable roles. This implies that an integration of economic preferences and personality traits, such as mindfulness, may improve the analysis of potential sources of variation in life outcomes. As mindfulness reflects on a healthier lifestyle (less smoking and smaller BMI) and higher life satisfaction, the findings furthermore point into the direction that the development of mindfulness skills might help students to grow social-emotional capacities and increase physical and psychological well-being.

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OVERVIEW OF PAPERS AND CO-AUTHORSHIP

This thesis includes the following papers:

Lima de Miranda, K., Maschke, M., & Schmidt, U. (2012). Der Glücksspielstaatsvertrag aus ökonomischer Perspektive. In Höfling, W., Horst, J., & Nolte, M. (Eds.), *Sportwetten in Deutschland* (pp. 9-24), Tübingen: Mohr Siebeck.

Schmidt, U., & Lima de Miranda, K. (2013). Regulierung des Glücksspiels in Deutschland: Das Glücksspielgesetz Schleswig-Holsteins und der Glücksspieländerungsstaatsvertrag aus ökonomischer Perspektive. *Zeitschrift für Wirtschaftspolitik*, 62(1), 82-94. doi.org/10.1515/zfwp-2013-0108.

Friedl, A., Lima de Miranda, K., & Schmidt, U. (2014). Insurance demand and social comparison: An experimental analysis. *Journal of Risk and Uncertainty*, 48(2), 97-109. doi:10.1007/s11166-014-9189-9.

Lima de Miranda, K., Detlefsen, L., & Schmidt, U. (2016). The Risky Shift Phenomenon in Group Decisions: Does Gender Matter?. *mimeo*.

Lima de Miranda, K. (2016). Mindfulness, Preferences and Well-Being: Mindfulness predicts adolescents' field behavior. *mimeo*.

Each co-author contributed significantly to the concept, design and content of the articles.

The following paper is not part of this thesis:

Schmidt, U., Friedl, A., Eichenseer, M., & Lima de Miranda, K. (2016). Social Comparison and Gender Differences in Risk Taking. *mimeo*.

PART I

PAPER 1: DER GLÜCKSSPIELSTAATSVERTRAG AUS ÖKONOMISCHER PERSPEKTIVE

Katharina Lima de Miranda, Mario Maschke, Ulrich Schmidt

1 EINLEITUNG

Der deutsche Glücksspielmarkt ist stark reguliert und der Staat lässt, mit der Begründung der Sucht- und Manipulationsprävention, nur sehr beschränkt Glücksspiele zu. Auf weiten Teilen des Glücksspielmarktes beansprucht der Staat eine Monopolstellung. Der bestehende deutsche Glücksspielstaatsvertrag wurde vom EU-Gerichtshof für mit dem Europa-Recht unvereinbar erklärt und läuft 2011 aus¹, daher findet derzeit eine intensive Debatte um die Neuregulierung des deutschen Glücksspielmarktes statt.

Neben der juristischen Lage besteht weiterhin Anlass über eine Neuregulierung zu diskutieren, da die Umsätze auf dem Glücksspielmarkt in den letzten Jahren zurückgegangen sind und sich der Markt hinsichtlich neuer, schnell wachsender Angebote im Internet stark im Wandel befindet. So scheint beispielsweise eine Aufrechterhaltung des Glücksspielmonopols in Anbetracht der rasant steigenden und schwer kontrollierbaren Online-Wetten technisch fast unmöglich.

Nach langem Festhalten an dem staatlichen Glücksspielmonopol gibt es in Deutschland mittlerweile Anzeichen für eine neue Auslegung. Marktexperten gehen davon aus, dass es zu einer teilweisen Liberalisierung des deutschen Glücksspielmarktes kommen wird. Ein erster gemeinsamer Entwurf der Bundesländer sieht eine Öffnung des Sportwettmarktes in Deutschland unter sehr strengen Auflagen für private Buchmacher vor, während beim staatlichen Lotterie-Monopol keine Veränderungen geplant sind. Dieser Entwurf steht allerdings in der Kritik aufgrund seiner Begrenzung auf sieben Konzessionen und einer Besteuerung von 16,67% auf die Wetteinsätze. Außerdem ist nicht klar, ob dieser Entwurf von der EU notifiziert würde. Ein Gegenentwurf aus Schleswig-Holstein sieht eine weitgehende Liberalisierung des Sportwettmarktes vor.

Vor dem Hintergrund der ungeklärten Rechtslage und der Ineffizienzen, die ein Monopol aus ökonomischer Sicht mit sich bringt, wird im Folgenden der deutsche Sportwettmarkt, als Teilgebiet des Glücksspielmarktes, aus ökonomischer Perspektive betrachtet und auf mögliche Liberalisierungsszenarien eingegangen.

¹ EuGH-Urteile vom 08.09.2010, Rechtssachen C-316/07, C-358/07, C-359/07, C-360/07, C-409/07, C-410/07 (Markus Stoß u.a.), C-409/06 (Winner Wetten GmbH) und C-46/08 (Carmen Media Group Ltd).

2 GRUNDLAGEN

Nimmt man an einer Sportwette teil, so hat man die Möglichkeit auf bestimmte Ereignisse eines Wettkampfes zu wetten. Der Buchmacher legt vorher gewisse Quoten fest, zu denen man bieten kann. Bei einem Fußballspiel ist es beispielsweise möglich, auf einen Heimsieg, ein Unentschieden oder einen Auswärtssieg zu setzen. Bei dem Bundesligaspiel zwischen dem FC Bayern München und dem SC Freiburg am 29.10.2010 setzte der Buchmacher *bwin* die Quoten (1,3 / 5,0 / 9,0) fest. Bei einem Euro Wetteinsatz besagen diese Quoten, dass man im Falle eines korrekt prognostizierten Heimsiegs 1,30 EUR erhält, bzw. 5,00 EUR für ein Unentschieden und 9,00 EUR für einen Auswärtssieg des SC Freiburg. Bei einem falschen Tipp verliert man seinen Einsatz.

Geht man davon aus, dass es sich bei dem Sportwettmarkt um einen effizienten Markt nach Fama (1970) handelt, d.h. alle relevanten Informationen bis zum Spielbeginn bekannt sind und alle Wetten den gleichen Gewinnerwartungswert aufweisen, so ist es möglich, aus den Quoten auf die Wahrscheinlichkeiten der Spielausgänge zurückzuschließen. Lässt man die Margen der Buchmacher unberücksichtigt, ergibt sich die Wahrscheinlichkeit der Spielausgänge aus dem Kehrwert der entsprechenden Quote x_i . Die Summe der Wahrscheinlichkeiten für Heimsieg, Unentschieden und Auswärtssieg muss bei einer fairen Wette 1 ergeben:

$$\sum_{i=1}^3 \frac{1}{x_i} = 1 \quad (1)$$

Im vorliegenden Beispiel ergibt sich eine Summe, die größer als 1 ist:

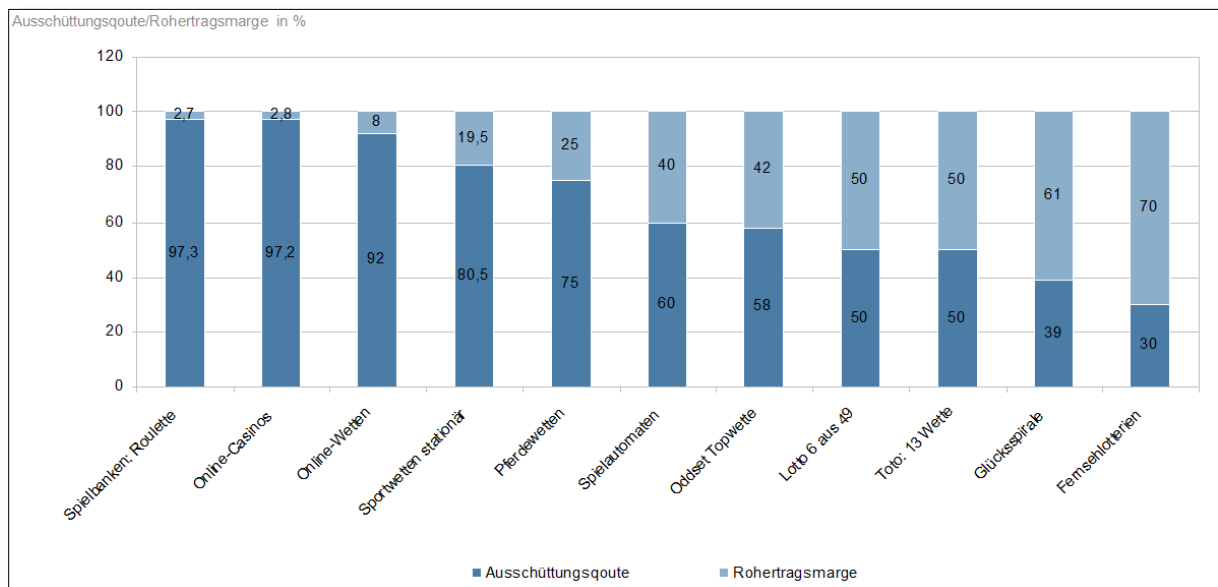
„Wahrscheinlichkeit“ Heimsieg:	1/1,3 = 0,77
„Wahrscheinlichkeit“ Unentschieden:	1/5,0 = 0,20
„Wahrscheinlichkeit“ Auswärtssieg:	1/9,0 = 0,11
<hr/>	
Summe	= 1,08.

Um die Eintrittswahrscheinlichkeiten zu ermitteln, müssen demnach die jeweiligen Quotenkehrwerte durch die gemäß Gleichung (1) berechnete Summe dividiert werden. Somit betrug die Wahrscheinlichkeit eines Sieges des FC Bayern München unter Annahme effizienter Quoten 71,2 %, so dass die erwartete Auszahlung des Wettnehmers bei ca. 92,6 % lag (Quote * Wahrscheinlichkeit). Die Marge des Buchmachers liegt dann bei 7,4 % und sein Rohertrag entspricht dem Produkt aus Marge und der Summe aller Wetteinsätze.

Da Wettnehmer bei Auszahlungsquoten von unter 100 % einen Verlust zu erwarten haben, bezeichnen Peel et al. (2005) solche Wetten als unfair (unfair odds). Generell liegen die

Auszahlungsquoten nicht nur bei Sportwetten unter 100%. Betrachtet man die Auszahlungsquoten verschiedener Glücksspiele im Vergleich, so befindet sich beispielsweise der staatliche Sportwettanbieter ODDSET im Mittelfeld. Mit 58 % bietet ODDSET jedoch eine deutlich niedrigere Auszahlungsquote als private Onlineanbieter, die im Mittel 92 % der Einsätze an den Wettnehmer ausschütten.

Abbildung 1: Auszahlungsquoten verschiedener Glücksspiele im Vergleich



Quelle: Goldmedia (2010)

Die zuvor berechneten Eintrittswahrscheinlichkeiten beruhen auf der Annahme informationseffizienter Quoten. Ein effizienter Wettmarkt setzt voraus, dass die Gewinnerwartungswerte zwischen allen alternativen Spielausgängen übereinstimmen. Wetten auf den Ausgang eines Spiels sind nur dann gleichermaßen profitabel, wenn die angebotenen Quoten der Buchmacher die objektiven Eintrittswahrscheinlichkeiten widerspiegeln, da anderenfalls Verzerrungen auftreten². Empirische Studien³ über die Effizienz von Wettmärkten zeigen jedoch die Existenz des sogenannten „Favourite-Longshot Bias“. Dieser besagt, dass Wetten auf wahrscheinlichere Ausgänge erfolgsversprechender sind als Wetten auf unwahrscheinliche Ereignisse und somit Ineffizienzen auf dem Wettmarkt auftreten. Pope und Peel (1989) untersuchten als erste die Effizienz der Wettquoten für Fußballspiele und fanden auch auf diesem Markt derartige Verzerrungen vor. Bei einer Betrachtung von über 80.000 Spielen in einem Zeitraum von 7 Jahren kommen Maschke und Schmidt (2010) ebenfalls zu dem Ergebnis, dass Buchmacher im Mittel bei wahrscheinlicheren Ergebnissen einen höheren Anteil der Wetteinsätze auszahlen. Sie finden also einen positiven Zusammenhang zwischen der berechneten Wahrscheinlichkeit und der Auszahlungsquote. Bei einer durchschnittlichen

² Franck et al. (2008)

³ Siehe unter anderem: Griffiths (1949), Ali (1977), Vaughan Williams und Paton (1997), Law und Peel (2002)

Auszahlungsquote von 88,98% schwankten die Auszahlungsquoten der einzelnen Wahrscheinlichkeitsintervalle stark. Bei Eintrittswahrscheinlichkeiten gemäß Quote von unter 15% wurden beispielsweise nur 69,45% der Einsätze ausgezahlt, während die Auszahlungsquote bei Wahrscheinlichkeiten von über 55% bei 95,98% lag.

Der in der Literatur am häufigsten verwendete Erklärungsansatz für diese Verzerrungen ist die Annahme, dass Wettnehmer sich risikofreudig verhalten⁴. Thaler und Ziemba (1988) begründen dieses risikofreudige Verhalten damit, dass Wetten nicht vornehmlich aus finanziellen Gründen abgeschlossen werden. Sie beschreiben die Wetten als ein Konsumgut, bei dem der Reiz größer ist, wenn Außenseiterwetten platziert werden.

Folglich können Buchmacher das Spielverhalten der Wettnehmer mit dem Ziel der Gewinnmaximierung ausnutzen, indem sie aufgrund der relativ höheren Nachfrage höhere Preise für Außenseiterwetten ansetzen und somit systematisch Ineffizienzen am Markt erzeugen. Maschke und Schmidt (2010) zeigen, dass die Quotenineffizienz beim staatlichen Anbieter ODDSET höher ist als bei privaten Anbietern. ODDSET scheint somit das Spielverhalten in einem stärkeren Maße auszunutzen, so dass das staatliche Monopol auf dem Sportwettmarkt zu suboptimalen Wohlfahrtseffekten hinsichtlich der Preissetzung führt.

Der 1. Hauptsatz der jüngeren Wohlfahrtsökonomie besagt, dass „jedes Wettbewerbsgleichgewicht (...) zu einer effizienten Allokation“ führt, wohingegen Monopole aufgrund höherer Preise im Allgemeinen nicht zu optimalen Allokationen führen. Staatliche Eingriffe sind aus ökonomischer Sicht nur sinnvoll, um die Einkommensverteilung zu glätten oder um Marktversagen entgegenzuwirken, falls es auf dem Markt nicht zu einer effizienten Allokation kommt. Dies ist der Fall bei öffentlichen Gütern, natürlichen Monopolen, asymmetrischen Informationen, externen Effekten oder meritorischen Gütern. Ein staatlicher Eingriff in den Markt, wie das staatliche Monopol auf dem Glücksspielmarkt, wäre aus ökonomischer Sicht dann zu rechtfertigen, wenn externe Effekte beseitigt oder mindestens deutlich gelindert würden.

Der Glücksspielmarkt birgt vor allem zwei Risiken für die Gesellschaft. Zum einen besteht die Gefahr der Manipulation. Insbesondere bei Sportwetten ist dieses Phänomen bekannt und man kann sich den Fall „geschmierter“ Schiedsrichter leicht ausmalen. Zum anderen stellt die Spielsucht ein Problem dar. Aufgrund dieser beiden Probleme, welche als negative externe Effekte das Gemeinwohl mindern können, lässt sich eine Regulierung des Marktes ökonomisch rechtfertigen. Der deutsche Staat begründet das Monopol auf dem Glücksspiel- und Sportwettmarkt daher auch durch diese negativen externen Effekte. Neben der Europäischen

⁴ Z.B. Sobel und Raines (2003)

Kommission bezweifeln allerdings auch viele Wissenschaftler⁵, dass ein staatliches Monopol hierfür geeignet und notwendig ist und fragen, ob der Staat nicht zusätzlich aus anderen Interessen, z.B. fiskalpolitischen oder Lobbygründen, an dem Monopol festhält.

3 SITUATION IN DEUTSCHLAND

Momentan ist der Glücksspielmarkt in Deutschland durch eine starke Regulierung charakterisiert. Durch den Glücksspielstaatsvertrag beansprucht der Staat eine Monopolstellung auf weiten Teilen des Marktes und lässt, mit der Begründung der Sucht- und Manipulationsprävention, nur sehr beschränkt Glücksspiele zu.

Allgemein lässt sich der deutsche Glücksspielmarkt in fünf Kategorien unterteilen: den Lottomarkt, Wettmarkt, Casinomarkt, Spiele-Markt und die Unterhaltungsautomaten. Weite Teile des Glücksspielmarktes werden durch den Glücksspielstaatsvertrag staatlich reguliert. Ausnahmen bilden Pferdewetten, welche durch das Rennwett- und Lotteriewettgesetz geregelt werden, und Geldspielautomaten oder gewerbliches Spielen, welche unter die Gewerbeordnung fallen. Es gibt jedoch auch Bereiche, die nicht reguliert sind, bzw. die einen unklaren juristischen Status haben. Dies betrifft insbesondere den Wettmarkt, der im Bereich der Internet-Buchmacher und stationären Wettshops weitgehend unreguliert ist. Desweiteren fehlt eine abschließende Regulierung des schnell wachsenden Onlinebereichs aller Kategorien.

3.1 Ökonomische Kennzahlen

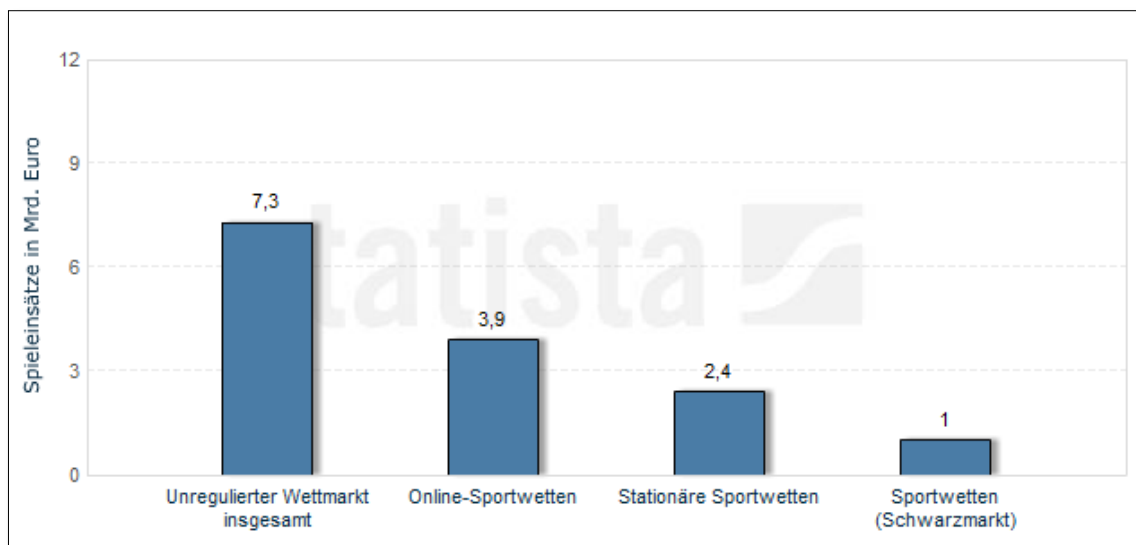
Laut Meyer (2011) beliefen sich die Umsätze auf dem deutschen Glücksspielmarkt (ohne Sportwetten) im Jahr 2009 auf 23,96 Mrd. Euro. Mit über 60% haben Spielbanken und Geldspielautomaten den größten Marktanteil. Der Anteil des Lotto- und Totoblocks beläuft sich auf ca. 30%.

Im Jahr 2009 wurde im regulierten Wettmarkt ein Umsatz von ca. 0,5 Mrd. Euro erwirtschaftet, wovon ca. 180 Mio. auf den staatlichen Anbieter ODDSET entfielen⁶. Betrachtet man im Vergleich dazu den unregulierten Teil des Wettmarktes (siehe Abbildung 2: Marktanteile im deutschen Wettmarkt) stellt man fest, dass ein Großteil der Umsätze aus dem Wettmarkt am Fiskus vorbeifließt. Einer Schätzung von Goldmedia (2010) zu Folge wurden 2009 im gesamten unregulierten Wettmarkt Spieleinsätze in Höhe von ca. 7,3 Mrd. Euro getätigt. Wie Abbildung 2 zeigt wurde ein Großteil davon bei Online-Sportwetten (3,9 Mrd.) eingesetzt, gefolgt von einem etwas geringeren Anteil bei stationären Sportwetten (2,4 Mrd.). Schließlich wird der Schwarzmarkt auf etwa 1 Mrd. Euro beziffert. Der Marktanteil von ODDSET beträgt am gesamten Wettmarkt also nur ungefähr 2,3%.

⁵ Z.B. Britschkat et al. (2008) und Quitzau, J. (2007).

⁶ Die Daten im folgenden Absatz entstammen einer Studie von Goldmedia (2010).

Abbildung 2: Marktanteile im deutschen Wettmarkt



Quelle: Goldmedia (2010)

Derzeit werden Wetteinsätze in Deutschland mit 16,67% besteuert. Bei einer Neuregelung, insbesondere bei einer Liberalisierung des Markts, wäre eine Besteuerung der Roherträge anstelle der Abgabe auf den Spieleinsatz denkbar. Dies hätte unter anderem den Vorteil, dass sich so die Online-Anbieter besser einbeziehen ließen. Auch die Roherträge in Deutschland haben durchaus ein ökonomisches Gewicht. 2009 wurden die Roherträge für den Wettmarkt auf insgesamt 1,2 Mrd. Euro geschätzt, wobei mit ca. 230 Mio. Euro etwa 20% auf den regulierten Markt entfielen. Der bedeutendere Teil entfiel jedoch auf den unregulierten Bereich; ca. 41% auf stationäre private Wetten, 25% auf Online-Sportwetten, sowie 14% auf den Schwarzmarkt.

Betrachtet man die Entwicklung des Marktes lässt sich feststellen, dass der Umsatz von dem staatlichen Sportwettanbieter ODDSET seit 2002 von über 500 Mio. auf unter 200 Mio. in 2009 gesunken ist. Als Gründe für diesen Trend können die stark ansteigenden Angebote für Sportwetten im Internet und die im internationalen Vergleich ungünstige Kostenverteilung bei ODDSET⁷ gesehen werden. Eine rückläufige Entwicklung der Umsätze lässt sich nicht nur auf dem Sportwettmarkt beobachten, sondern auch auf dem gesamten regulierten Glücksspielmarkt. Seit Einführung des Glücksspielstaatvertrags 2008 sind sowohl die Umsätze als auch die öffentlichen Einnahmen im Allgemeinen gesunken (vergleiche z.B. Rebbegiani, 2010). Im Gegensatz dazu konnte ein deutlicher Anstieg der Umsätze der Internetwetten weltweit festgestellt werden. Wurden 2004 weltweit nur ca. 16,3 Mrd. Euro Wetteinsätze in Internetwetten getätigt, so beliefen sich diese 2008 bereits auf 36,3 Mrd. Euro, Tendenz

⁷ Da die Abgaben in Deutschland im internationalen Vergleich sehr hoch sind, kann ODDSET seinen Kunden nur relativ schlechte Quoten anbieten.

steigend. H2 Gambling Capital⁸ schätzt z.B., dass die Wetteinsätze in 2012 bereits bei 50,7 Mrd. Euro und der Bruttospielertrag bei 4,0 Mrd. Euro liegen werden.

Bei dem Internetwettmarkt handelt es sich also um einen stark wachsenden Markt. Die de facto Nichtregulierung des Online-Wettmarktes führt zu weitreichenden Konsequenzen für das staatliche Wettmonopol und die staatlichen Einnahmen aus Glücksspielen. Sowohl aus Sicht der Suchtprävention als auch aus fiskalpolitischen Interessen erscheint eine Regulierung dieses Marktes sinnvoll.

3.2 Spielsucht

Staatliche Eingriffe in den Glücksspielmarkt werden zumeist mit der Spielsuchtproblematik gerechtfertigt. Tatsächlich weisen Glücksspiele ein hohes Suchtpotenzial auf und können so zu negativen Konsequenzen für den Spieler und sein soziales Umfeld führen (z.B. Verarmung oder illegale Handlungen zur Finanzierung der Spielsucht, Gefährdung oder Verlust von persönlichen Beziehungen und Arbeitsplatz). In der Folge kommt es auch zu negativen Auswirkungen und Kosten für die Gesellschaft. In einer Studie von Becker (2011) werden die sozialen Kosten des Glücksspiels in Deutschland auf 326 Mio. Euro (direkte und indirekte Kosten) im Jahr 2008 geschätzt⁹.

Die deutsche Hauptstelle für Suchtanfragen geht davon aus, dass rund 200.000 Personen in Deutschland pathologische Glücksspieler sind und zusätzlich rund 300.000 ein problematisches Spielverhalten aufweisen¹⁰. Besonders stark gefährdet sind Männer, sie stellen ca. 90% der Betroffenen dar. Nicht nur Geschlecht, sondern auch das Alter spielt eine entscheidende Rolle bei der Spielsuchtgefährdung. Im Vergleich zum Durchschnitt von 0,2%, sind Jugendliche mit einem Risiko von 3% besonders gefährdet. Das Suchtrisiko einzelner Glücksspielarten unterscheidet sich stark und hängt von einer Vielzahl von Faktoren ab. Becker (2009) hebt hervor, dass das Suchtrisiko durch die Ereignisfrequenz, den Auszahlungsrhythmus, persönliche Beteiligung, Verfügbarkeit und Produktgestaltung geprägt wird. Insbesondere Spiele mit einer hohen Ereignisfrequenz, wie Geldspielautomaten, Roulette, Poker oder Live-Wetten, haben ein hohes Suchtpotential. Außerdem weisen beispielsweise Kombinationswetten ein höheres Suchtpotential auf als Einzelwetten.

Eine Studie von Meyer & Hayer (2005) zeigt, dass ca. 70% der Süchtigen an Spielautomaten spielen, ca. 17 % Roulette und Black Jack und ca. 13% der Betroffenen Sportwetten abschließen. Spielautomaten stellen somit ein besonderes Suchtrisiko dar, unterliegen paradoxer Weise aber

⁸ H2 Gambling Capital (2008) – Sports Betting

⁹ Im Vergleich dazu: Die sozialen Kosten durch Alkoholkonsum werden auf 20 bis 30 Mrd. Euro geschätzt (etwa das Zweihundertfache).

¹⁰ Die Zahlen für pathologische Spieler schwanken in verschiedenen Studien, z.B. schätzen Kraus et al. (2010) knapp 150.000 während Buth & Stöver (2008) auf etwa 300.000 Personen kommen.

nicht dem Glücksspielstaatsvertrag. Geldspielautomaten in Spielhallen und Gaststätten unterliegen dem Gewerberecht und haben deutlich gelockerte Bestimmungen zum Spielerschutz. Besonders an diesem Punkt wird der staatliche Eingriff in den Glücksspielmarkt kritisiert. Denn das Glücksspielmonopol wird mit dem übergeordneten Ziel der Bekämpfung und Vermeidung von Spielsucht legitimiert, lässt aber eine Glücksspielart mit besonders hohem Risiko außen vor.

Zur Minderung der Spielsuchtgefahr gibt es neben der Monopollösung zahlreiche weitere Ansätze. Ähnlich wie bei Zigaretten, erhofft man sich von der Einschränkung, bzw. des Verbots von Werbung, dass Risikogruppen nicht zum Spielen verleitet werden und so gar nicht erst zum Glücksspiel kommen. Ein Verbot von besonders süchtig machenden Glücksspielen, wie Live- oder Kombinationswetten kommt weiterhin in Frage. Mit einem zentralen Erfassungssystem aller Einsätze der Spieler, könnte man das Spielverhalten überwachen und gegebenenfalls gefährdete Spieler sperren lassen. Um Anreize im Glücksspiel zu mindern, ist außerdem eine Besteuerung denkbar.

3.3 Wettmanipulation

Um die Gefahr der Wettmanipulation einzuschränken, sind verschiedene Maßnahmen denkbar. Eine Möglichkeit ist die Verpflichtung zur Teilnahme an Frühwarnsystemen, wie zum Beispiel das im Fußball verwendete Frühwarnsystem *Betradar*. Ein Verbot leicht zu manipulierender Wetten, z.B. „Wer bekommt die erste gelbe Karte?“, beugt ebenfalls Wettmanipulationen vor. Durch Besteuerung können wiederum Anreize gemindert und dadurch Wettmanipulation verringert werden.

4 NEUREGULIERUNG DES MARKTES

Aus ökonomischer Sicht lässt sich eine Regulierung des Glücksspielmarktes, aber keine Monopollösung rechtfertigen. Dies gilt auch für den Sportwettmarkt, für den eine Regulierung aufgrund der Suchtgefährdung, sowie der Wettmanipulation, gerechtfertigt scheint.

Da der Großteil der Spielsüchtigen durch das Automatenspiel zur Spielsucht kommt, sollte zur Bekämpfung der Spielsucht zu allererst das Automatenspiel, welches bis jetzt unter Bundesrecht und nicht unter den Glücksspielstaatvertrag fällt, stärker reguliert werden. Im Bereich des Wettmarktes ist das größte Problem, dass über 90% der Wetteinsätze im unregulierten Markt getätigt werden, der regulierte Markt also nur einen geringen Teil des Gesamtmarktes ausmacht. Im unregulierten Markt kann jedoch keine kontrollierte Vorsorge gegen Spielsucht betrieben und keine Regulierung hinsichtlich Wettmanipulation getroffen werden. Insbesondere stellt das Internet eine große Herausforderung in Sachen Suchtprävention dar. Denn die immer

weitreichenderen zumeist aus dem Ausland angebotenen Wetten können schwer reguliert und kontrolliert werden. Umso wichtiger wird in Zukunft also eine transparente und durchsetzbare Regulierung für Online Glücksspiele.

Neben den negativen externen Effekten, welche aus der Sucht- und Manipulationsproblematik resultieren können, spielen die öffentlichen Einnahmen eine Rolle bei einer Neuregulierung. Bei Milliarden-Umsätzen im unregulierten Markt, insbesondere dem Online-Markt, bleiben Steuereinnahmen in großer Höhe aus. Zusätzlich entsteht ein Verlust von Arbeitsplätzen, da sich diese durch den großen Internet- und Schwarzmarkt ins Ausland oder in rechtliche Grauzonen verlagern.

Im Folgenden soll daher betrachtet werden welche Möglichkeiten zur Neuregulierung des Glückspielmarktes aus ökonomischer Sicht sinnvoll erscheinen. Zuerst werden Möglichkeiten der Besteuerung erläutert und zum Vergleich und der besseren internationalen Einordnung andere europäische Länder betrachtet.

4.1 Besteuerung von Wetten

Die Besteuerung von Gewinnen aus Rennwetten und Lotterien werden durch das Rennwett- und Lotteriegesezt geregelt und unterliegen nicht der Einkommenssteuer. Spieleinsätze werden nach Deutschem Recht derzeit vorab mit einer Wettsteuer in Höhe von 16,67% auf Wetteinsätze besteuert. Die Steuereinnahmen (T) ergeben sich aus dem Produkt der Wettsteuer (t) und den Wetteinsätzen (W) gemäß Gleichung (2):

$$T = t * W. \quad (2)$$

Diese Art der Besteuerung ist insofern problematisch, als dass der Anbieter unabhängig von seinem tatsächlichen Gewinn besteuert wird. Die Steuer erhöht daher das Risiko des Anbieters, der im Gegenzug die Kosten an den Wettnehmer weitergibt. Das Glücksspiel ist dann im Vergleich zu Anbietern aus dem Ausland, die sich mit geringeren oder anderen Steuern konfrontiert sehen, unattraktiver.

Als Alternative ist die Besteuerung des Rohertrages denkbar. Anstelle der Wetteinsätze würden die Roherträge besteuert, welche sich aus der Gewinnmarge (M) multipliziert mit den Wetteinsätzen ergeben. Die Steuereinnahmen ergäben sich dann gemäß der Gleichung (3):

$$T = \tau * M * W \quad (3)$$

wobei τ dem Rohertragssteuersatz entspricht. Sollen die Einnahmen aus der Besteuerung der Wetteinsätze denen der Roherträge gleichen, wählt man einen aufkommensneutralen Steuersatz, wobei gelten muss:

$$t = \tau * M. \quad (4)$$

Zum Beispiel wäre bei einer Marge von 10% eine Besteuerung des Rohertrages mit 15% äquivalent zu einer Besteuerung der Einsätze mit 1,5%.

Die Rohertragssteuer birgt gewisse Vorteile. So müssen Unternehmen nur dann Steuern abführen, wenn sie tatsächlich Gewinne gemacht haben. Das Unternehmensrisiko wird somit gemindert, was sich positiv in Preisen und Wettbewerbsfähigkeit widerspiegeln sollte. Eine Einbeziehung des Online-Gamblings¹¹, welches bisher nicht besteuert wird, erscheint nur mit einer Rohertragssteuer möglich¹². Zudem kann davon ausgegangen werden, dass ein Übergang von der Besteuerung der Einsätze hin zur Besteuerung der Roherträge eine wohlfahrtssteigernde Wirkung haben wird.

Schmidt und Maschke (2010) haben gezeigt, dass eine Rohertragssteuer tendenziell zu geringeren Margen führt, d.h. zu einer Senkung der Preise, und somit zu einem attraktiveren Angebot für den Wettnehmer.

4.2 Der Wettmarkt in Europa

Ein weiteres Kriterium bei der Ausgestaltung einer neuen Regulierung des deutschen Glücksspielmarkts ist die Harmonisierung auf EU-Ebene. Das Europäische Parlament spricht den Mitgliedsstaaten explizit das Recht zu, ihre Glücksspielmärkte gemäß ihren Traditionen und Kulturen selbst zu regulieren. Eine einheitliche Regelung des Glücksspielmarktes für die Mitgliedsstaaten gibt es daher nicht.

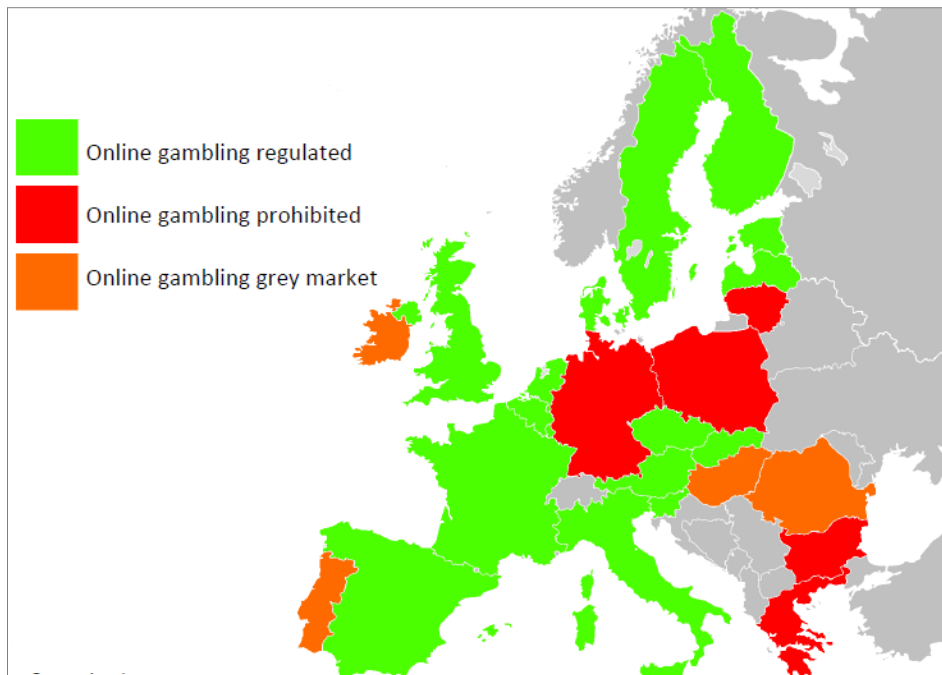
Die Glücksspiel- bzw. Sportwettmärkte innerhalb der Europäischen Union unterscheiden sich vor allem in Bezug auf die Besteuerung und den Grad der Regulierung. Neben traditionellen Unterschieden haben die Mitgliedsstaaten in verschiedenen Weisen auf die aktuellen Veränderungen des Marktes reagiert. Denn die Rahmenbedingungen des Wettmarktes haben sich in den letzten Jahren, durch den Abbau von Handelsbarrieren innerhalb der EU und dem rasanten Anstieg der Internetnutzung, stark gewandelt. Daher sind auch die Regulierungen in diesem Bereich recht heterogen zwischen den Mitgliedsstaaten der EU.

Regulierungsmodelle variieren vom staatlichen Glücksspielmonopol, wie in Deutschland über sehr liberale Modelle wie beispielsweise in Großbritannien. Abbildung 3 zeigt einen Überblick über die Regulierung vom Online-Gambling, dem Markt der sich zurzeit besonders stark verändert.

¹¹ Als Online-Gambling werden z.B. Online-Spiele, Online-Poker und Online-Casino bezeichnet.

¹² Eine Besteuerung der Einsätze wäre z.B. beim Roulette aufgrund der aus den Spielregeln hervorgehenden hohen Auszahlungsquote für die Anbieter nicht rentabel.

Abbildung 3: Regulierung des Online-Gambling in Europa



Quelle: Gambling Compliance, Regulatory Reports (2011)

4.2.1 Regulierung in Großbritannien

Der Wettmarkt in Großbritannien wurde bereits 1968 liberalisiert und ist seither im europäischen Vergleich relativ wenig reguliert. Die Britische Gambling Commission schätzte den Bruttospielertrag 2009/2010 auf rund 6,3 Mrd. Euro (ca. £ 5,7)¹³. Aktuell belaufen sich die Wetteinsätze in Großbritannien auf rund 50 Mrd. Euro, woraus ein Steueraufkommen (exklusive Lohn- und Umsatzsteuer) von 550 Mio. Euro resultiert. Aufgrund abwandernder Wettanbieter und sinkender Steuereinnahmen wurde 2001 die Steuer von 6,75% auf den Wetteinsatz durch eine Rohertragssteuer in Höhe von 15% ersetzt. 2005 wurde der Gambling Act beschlossen, welcher die Gründung einer den Wettmarkt überwachenden Glücksspielkommission nach sich zog. Des Weiteren müssen Wettanbieter seither eine Lizenz erwerben. Während auf der einen Seite die Kontrollen verschärft wurden, sind auf der anderen Seite die Restriktionen für Radio- und Fernsehwerbung gelockert worden. Der britische Gambling Act steht in der Kritik, weil auch nicht-lizenzierte Wettanbieter werben und Online-Wetten auch mit ausländischer Lizenz (z.B. Gibraltar) angeboten werden dürfen.

4.2.2 Regulierung in Österreich

Im Gegensatz zu Deutschland werden einfache Sportwetten in Österreich nicht als Glücksspiel sondern als Geschicklichkeitsspiel angesehen, mit der Begründung, dass Sportwetten nicht übermäßig vom Zufall abhängen. Sportwetten fallen in Österreich daher nicht unter das

¹³ UK Gambling Commission – Industry statistics 2009/10

staatliche Glücksspielmonopol sondern unterliegen der Länderkompetenz. Sowohl private als auch staatliche Anbieter von Sportwetten sind zugelassen, wenn sie eine Lizenz erwerben, welche die Prüfung von Befähigung, Zuverlässigkeit, Bonität u.a. voraussetzt. Zum Schutz der Spieler beaufsichtigt das österreichische Bundesministerium für Finanzen die lizenzierten Sportwettanbieter, es besteht ein Werbeverbot für nicht-lizenzierte Anbieter, insbesondere im Internet. Das Angebot von Glücks- und Wettspielen ist gesetzlich beschränkt und Anbieter werden auf Seriosität überprüft. 1995 wurde die Steuer auf Spieleinsätze von 6% auf 2% gesenkt, welche aber erst seit 2005 einheitlich im Gebührengesetz geregelt wurde. Der Wettumsatz in Österreich ist von 2002 bis 2007 um das Sechsfache gestiegen und betrug 2008 auch aufgrund der Möglichkeit für Werbung und Online-Vertrieb 1,03 Mrd. Euro¹⁴. Der Wettmarkt hat sich nach der UEFA EURO 2008 etwas abgekühlt und infolge sind die Einsätze in Sportwetten zurückgegangen. Nichts desto trotz sind die Spieleinsätze auf dem Gesamtmarkt (Glücksspiel und Sportwetten) von 2008 auf 2009 um 1,4% gestiegen und beliefen sich 2009 auf knapp 14,4 Mrd. Euro¹⁵.

4.2.3 Regulierung in Italien

Italien war eins der ersten europäischen Länder, das den Online-Glücksspielmarkt reguliert hat. 2002 wurde dort ein recht liberales Lizenzierungsmodell eingeführt, welches Online-Glücksspiel unter bestimmten Voraussetzungen zulässt und von der AAMS (Amministrazione autonoma dei monopoli di Stato) reguliert wird. Um den regulierten Glücksspielmarkt zu stärken, dürfen bspw. auch ausländische Akteure Sportwetten in Italien anbieten. Auf der anderen Seite sind Internetprovider verpflichtet, Seiten von nicht-lizenzierten Glücksspielanbietern zu sperren. Als eine Bedingung für die Online Lizenzierung gilt die Schaffung von Spielerkonten, welche Spieleinsätze limitieren und den Spielern eine konkrete Auszahlung der Gewinne zusichern. Im April 2011 gab es etwa 1,4 Mio. aktive Spielerkonten. Online-Gambling wird in Italien mit 20% auf die Roherträge besteuert. 2009 beliefen sich die Spieleinsätze im regulierten Online-Glücksspiel in Italien auf über 3 Mrd. Euro. Durch die effektive Regelung werden bis 2012 voraussichtlich 90% des Online-Glücksspiels bei lizenzierten Anbietern stattfinden¹⁶. Betrachtet man den Gesamtmarkt in Italien so verzeichnete der Glücksspielmarkt 2009 einen Umsatz von 54,4 Mrd. Euro.

4.3 Schätzung für Deutschland

Viele Befürworter einer Liberalisierung des deutschen Glücksspiel- und Wettmarktes argumentieren mit einem starken Wachstum des Marktes, einhergehend mit einem Anstieg der öffentlichen Einnahmen im Falle einer Deregulierung des Marktes. Nach Schätzungen einer

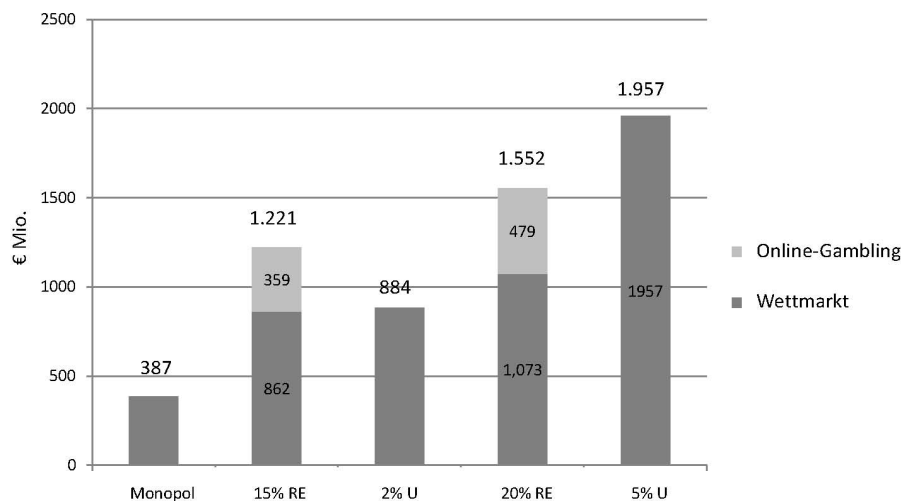
¹⁴ Deloitte & Touche 2010

¹⁵ BRANCHENRADAR® Glücksspiel & Sportwetten in Österreich 2010

¹⁶ Einschätzung von H2 Gambling Capital (2010)

Studie von Deloitte & Touche aus dem Jahr 2010 ergäben sich die folgenden kumulierten Einnahmen aus Wett-, Lohn- und Ertragsteuer für 2012-2015. Zugrunde gelegt sind unter anderen die Annahme, dass eine Regulierungsquote von 82,5% erzielt wird, d.h. 82,5% der Wettanbieter in den regulierten Markt eintreten und in Deutschland besteuert werden, sowie die Annahme, dass Werbung nur für lizenzierte Anbieter gestattet ist, was als ein wesentliches Kriterium für die Attraktivität des regulierten Marktes gesehen wird.

Abbildung 4: Geschätzte Steuereinnahmen für Deutschland (kumuliert 2012-2015)



Quelle: Deloitte & Touche (2010), S.44

Würde das staatliche Monopol auf Sportwetten aufrecht erhalten, d.h. der staatliche Sportwetten-Anbieter (ODDSET) bliebe alleiniger legaler Anbieter in Deutschland, fielen die kumulierten Steuereinnahmen mit 387 Mio. Euro am geringsten aus. Deutlich höher lägen die Steuereinnahmen bei einer Liberalisierung.

Wie bereits diskutiert gibt es zwei Varianten der Besteuerung – eine Steuer auf die Spieleinsätze oder eine Besteuerung der Roherträge. Bei der vorliegenden Schätzung entsprächen die Steuereinnahmen einer 15%igen Rohertragssteuer (862 Mio. Euro) ungefähr einer 2%igen Umsatzsteuer (884 Mio. Euro). Allerdings könnte bei einer Rohertragssteuer auch der Online-Wettmarkt miteinbezogen werden, was aufgrund der spezifischen Geschäftsmodelle von Branchenexperten bei einer Umsatzsteuer nicht für möglich gehalten wird. So ergibt sich ein Steuervolumen von insgesamt 1,2 Mio. Euro bei einer 15%igen Rohertragssteuer. Eine Rohertragssteuer von 20% ließe die Einnahmen nochmals, auf insgesamt 1,6 Mrd. Euro, steigen. Die höchsten Einnahmen ließen sich, der Studie zu folge jedoch bei einer Umsatzsteuer von 5% erzielen und beliefen sich auf knapp 2 Mrd. Euro. Allerdings warnen die Autoren der Studie vor einer zu hohen Besteuerung und stellen die Nachhaltigkeit dieses Szenarios in Frage.

Eine Deregulierung des Glücksspielmarktes, hier beispielhaft für den Sportwettenmarkt gezeigt, stellt eine aus fiskalpolitischen Aspekten interessante Alternative für den Staat dar und wird von Experten befürwortet¹⁷. Dem Spieler- und Manipulationsschutz könnte über Regulierungen und Lizenzierung der Anbieter auch weiterhin Rechnung getragen werden.

5 FAZIT

Aus ökonomischer Sicht lässt sich ein Wettmonopol nicht rechtfertigen. Aufgrund der negativen Auswirkungen von Spielsucht und Wettmanipulation besteht zwar ein Regulierungsbedarf, der jedoch auch ohne Monopol realisiert werden kann.

Die derzeitige Situation erscheint unbefriedigend, da Steuereinnahmen und Arbeitsplätze wegfallen, ohne dass etwas im Hinblick auf die Prävention von Spielsucht und Wettmanipulation gewonnen wird. Aus ökonomischer Sicht erscheint eine regulierte Öffnung des Marktes sinnvoll. Diese könnte z.B. durch ein Lizenzierungsverfahren realisiert werden. Jeder Anbieter, der gewisse Voraussetzungen erfüllt, erhalte dann eine Lizenz. Bei der Regulierung ist darauf zu achten, dass ein möglichst großer Anteil der Einsätze im regulierten Markt getätigt wird. Insbesondere sollte es ein Werbeverbot für nicht-lizenzierte Anbieter geben, das Online-Gambling mit einbezogen und ein moderater Steuersatz (z.B. 15% auf den Rohertrag) festgelegt werden. Weiterhin wäre eine Regelung zur Sperrung von Internetseiten, wie in Italien, denkbar.

Um die negativen Auswirkungen des Glücksspiels gering zu halten, sollte die Regulierung so ausgestaltet sein, dass möglichst wirksam gegen Wettmanipulation und Spielsucht vorgegangen werden kann. Möglichkeiten hierzu werden in einer aus Lizenzgebühren finanzierten Aufsichtsbehörde, der zentralen Erfassung aller Einsätze und der Einschränkung von Werbung gesehen.

¹⁷ Z.B. Rebeggiani (2010) kommt zu ähnlichen Ergebnissen wie die Deloitte Studie.

6 LITERATUR

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PAPER 2: REGULIERUNG DES GLÜCKSSPIELS IN DEUTSCHLAND: DAS GLÜCKSSPIELGESETZ SCHLESWIG-HOLSTEINS UND DER GLÜCKSSPIELÄNDERUNGSSTAATSVERTRAG AUS ÖKONOMISCHER PERSPEKTIVE

Ulrich Schmidt und Katharina Lima de Miranda

1 EINLEITUNG

Angesichts des 2011 ausgelaufenen und vom Europäischen Gerichtshof für mit dem Europa-Recht unvereinbar erklärten deutschen Glücksspielstaatsvertrag¹, findet derzeit eine intensive Debatte um die Neuregulierung des deutschen Glücksspielmarktes statt. Bisher war der Glücksspielmarkt in Deutschland durch eine starke Regulierung charakterisiert. Der Staat beanspruchte eine Monopolstellung auf weiten Teilen des Marktes und ließ, mit der Begründung der Sucht- und Manipulationsprävention, nur sehr beschränkt Glücksspiele zu. Im Bereich der Sportwetten war im Wesentlichen nur ein Anbieter (Oddset) zugelassen, der bei seiner Geschäftsausübungen starken Beschränkungen ausgesetzt war. Insbesondere die hohe Abgabenlast (u.a. fallen nach dem Rennwett- und Lotteriegesezt Steuerabgaben in Höhe von 16,67% der Wetteinsätze an) verhinderte es, dass Oddset im Vergleich zu Anbietern mit Sitz in Steueroasen wie Malta oder Gibraltar wettbewerbsfähige Quoten anbieten konnte. Dies hat dazu geführt, dass der unregulierte Online-Markt auf Kosten von Oddset stark angestiegen ist. So betrug der Marktanteil im Jahr 2009 nur noch 2,3% (Goldmedia, 2010). Da gleichzeitig auch die Steuereinnahmen stark gesunken sind, haben die Bundesländer bereits vor geraumer Zeit Handlungsbedarf erkannt.

Schleswig-Holstein hat eine neue, sehr liberale Regulierung (Gesetz zur Neuordnung des Glücksspiels, GlückG) umgesetzt und ist somit aus dem Verbund der übrigen Bundesländer ausgeschert. Diese haben mit dem sogenannten Glücksspieländerungsstaatsvertrag (GlüÄndStV) den Markt ebenfalls liberalisiert, jedoch zu einem geringeren Grad, als Schleswig-Holstein dies getan hat. Der GlüÄndStV trat zum 01.07.2012 in Kraft und wurde von 15 Bundesländern unterzeichnet.

Im vorliegenden Beitrag sollen die Regulierungskonzepte des GlückG und des GlüÄndStV aus ökonomischer Perspektive verglichen werden. Dazu werden im nächsten Abschnitt mögliche

¹EuGH-Urteile vom 08.09.2010, Rechtssachen C-316/07, C-358/07, C-359/07, C-360/07, C-409/07, C-410/07 (Markus Stoß u.a.), C-409/06 (Winner Wetten GmbH) und C-46/08 (Carmen Media Group Ltd).

Ziele abgeleitet, die durch die Regulierung erreicht werden sollen. In Abschnitt 3 werden beide Konzepte detailliert dargestellt, so dass anschließend (Abschnitt 4) erörtert werden kann, bis zu welchem Grad sich die vorher formulierten Ziele jeweils erreichen lassen. Im letzten Abschnitt werden die Ergebnisse zusammengefasst und einige Schlussfolgerungen gezogen.

2 ÖKONOMISCHE GRUNDLAGEN

Gemäß dem „Ersten Hauptsatz der Jüngerer Wohlfahrtsökonomie“² führt jedes Wettbewerbsgleichgewicht zu einer effizienten Allokation, falls bestimmte Annahmen erfüllt sind. Somit sind staatliche Eingriffe aus Effizienzgesichtspunkten in der Regel abzulehnen³. Sie sind jedoch notwendig, um Steuereinnahmen zu erzielen, die die Wahrnehmung der originären Aufgaben des Staates sichern.

Die Erzielung von Steuereinnahmen war in der bisherigen Diskussion über die Regulierung des Glücksspiels stets ein wichtiger Parameter, der auch im vorliegenden Beitrag näher betrachtet werden soll. Es handelt sich dabei weitgehend um eine Ländersteuer. Im Jahr 2010 betragen die Einnahmen etwa 3,3 Milliarden Euro.

Aus ökonomischer Sicht kann die Besteuerung von Glücksspiel kritisch diskutiert werden. Die Inverse Elastizitäten Regel (Hicks 1947) besagt, dass vor allem Güter mit unelastischer Nachfrage, z.B. Güter des Grundbedarfs, hoch besteuert werden sollten, da bei diesen Gütern wenig Ausweichreaktionen zu erwarten sind und die Zusatzlast der Besteuerung gering bleibt. Der Glücksspielmarkt befindet sich hinsichtlich neuer, schnell wachsender Angebote im Internet stark im Wandel, so dass beim Glücksspiel inzwischen von einer relativ elastischen Nachfrage auszugehen ist. Eine Besteuerung führt dann zu Ausweichreaktionen beispielsweise zu ausländischen Anbietern oder in den unregulierten Markt. Diese These wird bekräftigt durch die Beobachtung, dass seit Einführung des Glücksspielstaatsvertrags 2008 sowohl die Umsätze als auch die öffentlichen Einnahmen aus dem regulierten Glücksspielmarkt sanken (vergleiche z.B. Rebbegiani, 2010), während beispielsweise ein deutlicher Anstieg der Umsätze der Internetwetten weltweit festgestellt werden konnte. Die Zusatzlast der Besteuerung steigt.

Auf der anderen Seite besagt die Corlett-Hague-Regel, dass Güter besteuert werden sollten, die komplementär zum Gut Freizeit sind um Wohlfahrtsverluste aus Konsumsteuern aufgrund von Substitutionseffekten zugunsten von Freizeit zu minimieren (Corlett und Hague 1953). Da es

² Im Allgemeinen wird die Form in der die Theoreme heute formuliert werden den Ökonomen Kenneth Arrow (1951) und Gerard Debreu (1959) zugeschrieben.

³ Betrachtet man neben der Effizienz auch die Einkommensverteilung, können staatliche Eingriffe auch dazu dienen, eine gerechtere Verteilung herzustellen. Dieser Gesichtspunkt erscheint im vorliegenden Problemfeld jedoch von untergeordneter Bedeutung.

sich beim Glücksspiel um eine Betätigung handelt, die in der Freizeit ausgeübt wird, erscheint eine Besteuerung in dieser Hinsicht sinnvoll.

Im Vordergrund der politischen Diskussion steht aber häufig nicht die Einnahmeerzielung, sondern der Lenkungszweck einer Besteuerung von Glücksspiel. Als Begründung für eine Besteuerung führt der Gesetzgeber unter anderem eine Minderung der Gewinnanreize im Glücksspiel auf. Eine Steuer auf Glücksspiel vor dem Hintergrund der Internalisierung negativer externer Effekte, die z.B. aus Spielsucht resultieren, ist allerdings kritisch zu bewerten. Da es eher zu Ausweichreaktionen der Spieler auf ausländische Anbieter oder den unregulierten Markt kommt als zu einem Spielverzicht wird der gewünschte Spielerschutz nicht sichergestellt.

Nicht außer Acht zu lassen bei der Betrachtung der Besteuerung von Glücksspiel ist der Fakt, dass die Einnahmen zu einem Großteil zur Unterstützung von Kunst- und Kulturprojekten sowie des Breitensports verwendet wird. Insbesondere die Landessportbünde beziehen aus den staatlichen Wetteinnahmen Gelder, die rund 80 Prozent ihres Haushalts ausmachen. Selbst wenn eine Besteuerung aus Effizienzgesichtspunkten nicht sinnvoll sein sollte, wird es politisch schwierig umzusetzen sein Steuern in diesem Bereich zu senken.

Eine weitere Rechtfertigung staatlicher Eingriffe kann durch Marktversagen erfolgen. Marktversagen liegt vor, wenn der Wettbewerbsmechanismus nicht zu einer effizienten Allokation führt, was dann der Fall ist, wenn mindestens eine der Annahmen des Ersten Hauptsatz der Jüngerer Wohlfahrtsökonomie nicht erfüllt ist. Die wichtigsten Fälle von Marktversagen sind öffentliche Güter, natürliche Monopole, asymmetrische Information und externe Effekte (Krugmann und Wells, 2006). Während die ersten drei Fälle für das Glücksspiel keine Bedeutung haben, spielen externe Effekte bei der Regulierung des Glücksspiels eine wichtige Rolle. Externe Effekte sind Auswirkungen ökonomischen Handelns auf Dritte (vgl. Mankiw, 2004) und können im Bereich des Glücksspiels aus zwei Gründen auftreten. Zum einen besteht die Gefahr der Wettmanipulation und zum anderen geht aus dem Glücksspiel eine nicht unerhebliche Suchtgefahr aus.

Wettmanipulation kann als negativer externer Effekt auf ehrliche Wettler sowie auf die Veranstalter von Sportereignissen angesehen werden, stellt aber genau genommen eine illegale Handlung und keinen externen Effekt dar. Buchmacher haben ein eigenständiges Interesse an der Bekämpfung von Wettmanipulation, da die von ihnen angebotenen Quoten bei Vorliegen von Manipulation verlustbringend sind. Aus diesem Grund haben sie freiwillig Vorkehrungen gegen Manipulationen wie beispielsweise durch das Frühwarnsystem „betradar“ getroffen. Da sich die beiden Regulierungen zudem kaum bezüglich der Bekämpfung von Wettmanipulationen unterscheiden, soll diese im vorliegenden Beitrag nicht weiter diskutiert werden.

Häufig wird auch die Spielsucht als externer Effekt von Glücksspielen charakterisiert. Die Suchtbekämpfung wurde als wesentliche Rechtfertigung des bisherigen Monopols in Deutschland herangezogen. Tatsächlich können Glücksspiele ein hohes Suchtpotenzial aufweisen und dadurch zu negativen Effekten für den Spieler und sein soziales Umfeld führen. Beispiele sind Verarmung, illegale Handlungen zur Finanzierung der Spielsucht, Gefährdung oder Verlust von persönlichen Beziehungen und Arbeitsplatz bis hin zu Depressionen und Selbstmord. Somit kommt es als direkter Effekt zu sehr negativen Auswirkungen für den Spieler, weshalb sich die Bekämpfung der Spielsucht als staatliches Ziel auch ohne das Vorliegen externer Effekte rechtfertigen ließe. Als Begründung ließe sich hier Präferenzversagen anführen. Es entstehen aber auch externe Kosten für die Gesellschaft, insbesondere durch Arbeitsunfähigkeit und Verlust des Arbeitsplatzes. In einer Studie von Becker (2011) werden die sozialen Kosten des Glücksspiels in Deutschland auf 326 Mio. Euro (direkte und indirekte Kosten) im Jahr 2008 geschätzt⁴. Staatliches Eingreifen zur Eingrenzen der Spielsucht scheint daher auch aus ökonomischer Sicht sinnvoll.

Die deutsche Hauptstelle für Suchtanfragen geht davon aus, dass rund 200.000 Personen in Deutschland pathologische Glücksspieler sind und zusätzlich rund 300.000 ein problematisches Spielverhalten aufweisen⁵. Besonders stark gefährdet sind Männer, sie stellen ca. 90% der Betroffenen dar. Nicht nur das Geschlecht, sondern auch das Alter spielt eine entscheidende Rolle bei der Spielsuchtgefährdung. Im Vergleich zum Durchschnitt von 0,2% in der Gesamtbevölkerung, sind Jugendliche mit einem Risiko von 3% besonders gefährdet. Das Suchtrisiko einzelner Glücksspielarten unterscheidet sich stark und hängt von einer Vielzahl von Faktoren ab. Becker (2009) hebt hervor, dass das Suchtrisiko durch die Ereignisfrequenz, den Auszahlungsrhythmus, persönliche Beteiligung, Verfügbarkeit und Produktgestaltung geprägt wird. Insbesondere Spiele mit einer hohen Ereignisfrequenz, wie Geldspielautomaten, Roulette, Poker oder Live-Wetten, haben ein hohes Suchtpotential. Außerdem weisen Kombinationswetten ein höheres Suchtpotential auf als Einzelwetten.

Eine Studie von Meyer und Hayer (2005) zeigt, dass ca. 70% der Süchtigen an Spielautomaten spielen, ca. 17% Roulette und Black Jack und ca. 13% der Betroffenen Sportwetten abschließen. Spielautomaten stellen somit ein besonderes Suchtrisiko dar, unterliegen paradoxer Weise aber nicht dem Glücksspielstaatsvertrag. Geldspielautomaten in Spielhallen und Gaststätten unterliegen dem Gewerberecht und haben deutlich gelockerte Bestimmungen zum Spielerschutz. Besonders an diesem Punkt wird der staatliche Eingriff in den Glücksspielmarkt kritisiert. Denn das Glücksspielmonopol wird mit dem übergeordneten Ziel der Bekämpfung und

⁴ Im Vergleich dazu: Die sozialen Kosten durch Alkoholkonsum werden auf 20 bis 30 Mrd. Euro geschätzt (etwa das Zweihundertfache).

⁵ Die Zahlen für pathologische Spieler schwanken in verschiedenen Studien, z.B. schätzen Kraus et al. (2010) knapp 150.000 während Buth und Stöver (2008) auf etwa 300.000 Personen kommen.

Vermeidung von Spielsucht legitimiert, lässt aber eine Glücksspielart mit besonders hohem Risiko außen vor.

Zur Minderung der Spielsuchtgefahr gibt es neben der Monopollösung zahlreiche weitere Ansätze. Ähnlich wie bei Zigaretten, erhofft man sich von der Einschränkung, bzw. des Verbots von Werbung, dass Risikogruppen nicht zum Spielen verleitet werden und so gar nicht erst zum Glücksspiel kommen. Eine andere Form der Suchtprävention stellen breite Aufklärungskampagnen und frühzeitige Hilfsangebote für Betroffene und deren Familien dar. Ein Verbot von besonders süchtig machenden Glücksspielen, wie Live- oder Kombinationswetten kommt weiterhin in Frage. Mit einem zentralen Erfassungssystem aller Einsätze der Spieler, könnte man das Spielverhalten überwachen und gegebenenfalls gefährdete Spieler sperren lassen. Dabei sollte allerdings angemerkt werden, dass bei Maßnahmen, die den suchtgefährdeten Spieler in seinem Spielen einschränken, Ausweichreaktionen z.B. in den unregulierten Markt zu erwarten sind.

Vor diesem Hintergrund erscheint zur Bekämpfung der Spielsucht zu allererst eine stärkere Regulierung des Automatenspiels sinnvoll. Dies fällt aber nach wie vor unter Bundesrecht und nicht unter den Glücksspielstaatvertrag und spielt daher in den diskutierten Gesetzen eine untergeordnete Rolle. Im Bereich des Wettmarktes ist das größte Problem, dass über 90% der Wetteinsätze im unregulierten Markt getätigt werden, der regulierte Markt also nur einen geringen Teil des Gesamtmarktes ausmacht. Im unregulierten Markt kann jedoch keine kontrollierte Vorsorge gegen Spielsucht betrieben und keine Regulierung hinsichtlich Wettmanipulation getroffen werden. Insbesondere das Internet stellt eine große Herausforderung in Sachen Spielerschutz und Suchtprävention dar. Denn die immer weitreichenderen zumeist aus dem Ausland angebotenen Wetten können schwer reguliert und kontrolliert werden. Daher erscheint eine transparente und durchsetzbare Regulierung für Online Glücksspiele als zwingend notwendig.

Insgesamt lässt sich festhalten, dass mit der Regulierung des Glücksspielmarktes aus ökonomischer Sicht insbesondere zwei Ziele verfolgt werden, Erzielung von Steuereinnahmen und Eindämmung der Spielsucht. Weitere Aspekte wie Bekämpfung von Wettmanipulation und Geldwäsche werden im Folgenden außer Acht gelassen.

3 VERGLEICH DER REGULIERUNGEN

Das GlückG und der GlüÄndStV unterscheiden sich in zahlreichen Details, so dass an dieser Stelle nur die aus ökonomischer Sicht bedeutendsten Unterschiede angesprochen werden können.

Dabei fällt besonders der Bereich der Sportwetten auf, indem eine Liberalisierung stattgefunden hat. Bisher waren Sportwetten nur vom staatlichen Sportwettenanbieter ODDSET erlaubt. Nach dem GlückG dürfen nun auch private Anbieter Sportwetten betreiben. Hingegen enthält der GlüÄndStV lediglich eine Experimentierklausel für Sportwetten, welche private Anbieter für einen auf sieben Jahre begrenzten Zeitraum zulässt. Private Anbieter von Sportwetten müssen eine Lizenz erlangen, wobei die Anzahl der Lizenzen beim GlüÄndStV auf 20 beschränkt ist. Eine solche Beschränkung, die es beim GlückG nicht gibt, erscheint ökonomisch kaum zu rechtfertigen. Es ist für uns nicht ersichtlich, welche Ziele mit der sich daraus ergebenden Einschränkung des Wettbewerbs erreicht werden können. Ein staatlich regulierter Markteintritt und die Überwachung von Anbietern erscheint hingegen sinnvoll, um Spieler vor Betrug zu schützen und für Transparenz zu sorgen, desweiteren ist es aus kommerzieller Sicht wichtig, dass Gewinn- und Rechtsicherheit besteht. Das Lizenzierungsverfahren ist im GlüÄndStV genauer geregelt und deutlich umfangreicher für den Anbieter als es der GlückG vorsieht.

Besonders bedeutsam aus ökonomischer Sicht ist die Besteuerung. Die Bemessungsgrundlage beim GlückG ist durch den Rohertrag, d.h. die Wetteinsätze abzüglich der Gewinnauszahlungen, gegeben, der mit einem Satz von 20% besteuert wird. Im Vergleich zu dieser Rohertragssteuer wird beim GlüÄndStV wie bisher eine Wetteinsatzsteuer gewählt. Dies bedeutet, dass die Wetteinsätze als Bemessungsgrundlage dienen, die mit einem Satz von 5% besteuert wird. Beide Besteuerungsmodelle unterscheiden sich somit deutlich, was starke Auswirkungen auf die jeweils zu erwartende Entwicklung des Glücksspielmarktes in Deutschland hat. Dies wird im nächsten Abschnitt eingehend diskutiert.

Ein weiterer wichtiger Unterschied ist die Tatsache, dass beim GlückG neben den Sportwetten auch Online-Poker und –Casinos in die Regulierung einbezogen werden. Damit wird ein Bereich abgedeckt, der bisher gesetzlich nicht geregelt war. Denn obwohl das Anbieten von Online-Poker und –Casinos bisher in Deutschland verboten war, konnten Spieler bereits seit langem im Internet ausländische Angebote finden. Dies bedeutete zum einen Einbußen bei den Steuereinnahmen und zum anderen ist bei den ausländischen Anbietern de facto keine Kontrolle möglich. Beim GlüÄndStV sollen diese Spiele wie bisher prinzipiell verboten sein und verbleiben somit im unregulierten Markt.

Beide Gesetze enthalten Regelungen zum Spielerschutz in denen es um Information, Werbung, Aufklärung und Sozialkonzepte geht. Zusätzlich sind beim GlüÄndStV zahlreiche Maßnahmen zur Eindämmung der Spielsucht vorgesehen. Zu nennen sind hier insbesondere die Begrenzung der Einsätze auf 1000 Euro im Monat, starke Einschränkungen bei der Werbung sowie das Verbot besonders suchtgefährdender Wettarten wie Live-Wetten. Veranstalter, die im Internet agieren, sind außerdem dazu verpflichtet vierteljährlich über die Zahl der Spieler und die Höhe

der Einsätze zu informieren. Beim GlückG sind die Vorkehrungen gegen die Spielsucht dagegen weniger restriktiv. Insbesondere wird Werbung im Fernsehen und Internet nicht grundsätzlich verboten, wie es das GlüÄndStV vorsieht. Ähnlich wie im GlüÄndStV darf Werbung aber nicht irreführend sein, in Widerspruch zu den im Gesetz formulierten Zielen stehen oder gezielt Minderjährige ansprechen. Beide Gesetze treffen ähnliche Regelungen zu Spielersperren.

4 ÖKONOMISCHE BEWERTUNG

In diesem Abschnitt soll untersucht werden, inwieweit die beiden Regulierungen dazu geeignet sind, die in Abschnitt 2 formulierten Ziele (Erzielung eines möglichst hohen Steueraufkommens und Eindämmung der Spielsucht) zu erreichen. Dabei wird davon ausgegangen, dass es in Zukunft nicht zu Sperrungen des Internetauftritts nicht-lizenzierter Anbieter kommen wird. Derartige Sperrungen sind aus juristischer Sicht problematisch und technisch leicht zu überwinden. Wohl aus diesen Gründen wurde der im ersten Entwurf (Stand April 2011) des GlüÄndStV in § 9, Abs. 1, Satz 3, Nr. 5 enthaltene Passus „*[Die zuständige Behörde kann insbesondere] Diensteanbietern im Sinne des Telemediengesetzes, insbesondere Zugangs Providern und Registraren, nach vorheriger Bekanntgabe unerlaubter Glücksspielangebote die Mitwirkung am Zugang zu den unerlaubten Glücksspielangeboten untersagen. Das Grundrecht des Fernmeldegeheimnisses (Artikel 10 des Grundgesetzes) wird insoweit eingeschränkt*“ im überarbeiteten Entwurf vom 6. Oktober 2011 wieder gestrichen.

4.1 Erzielung von Steuereinnahmen

Die Höhe der Steuereinnahmen wird insbesondere durch die Höhe des Steuersatzes, die Steuerbemessungsgrundlage, den Anteil des unregulierten Marktes und das Preissetzungsverhalten der Anbieter bestimmt. Bei der bisher geltenden und auch im GlüÄndStV vorgesehenen Wetteinsatzsteuer (WES) ist das Steueraufkommen T^{WES} durch $T^{WES} = tW$ gegeben, wobei t den Steuersatz und W die Wetteinsätze darstellen. Im GlückG ist dagegen eine Rothertragssteuer (RES) verankert. Diese besteuert den Bruttoerlös der Anbieter, d.h. den Spieleinsatz abzüglich der Gewinnauszahlungen. Bezeichnet man die Marge der Anbieter mit p und den Steuersatz mit τ , ergibt sich das Aufkommen T^{RES} einer RES durch $T^{RES} = \tau pW$. Bei Konstanz der Wetteinsätze führen beide Steuern somit zu einem identischen Aufkommen, falls $t = \tau p$ gilt. Unterstellt man wie Barth und Becker (2012) eine Marge von 10%, entspricht der Steuersatz von 20% im GlückG also einer WES in Höhe von 2%. Dies zeigt, dass die im GlückG beschlossene Besteuerung niedriger als die im GlüÄndStV ist. Dies führt jedoch nicht zwangsläufig zu niedrigeren Steuereinnahmen, da die niedrigere Besteuerung den Wettbewerbsnachteil der lizenzierten Anbieter gegenüber Anbietern aus Steueroasen (in Gibraltar gilt bspw. eine Wetteinsatzsteuer in Höhe von 1%) senkt und somit den Anteil des

regulierten Marktes erhöht. Es existieren zwei aktuelle Schätzungen (PwC, 2011, Barth und Becker, 2012) für Deutschland, die das Steueraufkommen beider Regulierungen miteinander vergleichen. Ein Überblick über diese Schätzungen befindet sich in Tabelle 1.

Tabelle 1: Vergleich des Steueraufkommens

Studie	PwC			Barth & Becker	
	WES 4%	WES 8%	RES 20%	WES 5%	RES 20%
Anteil regulierter Markt	50%	18%	80%	60%	80%
Steueraufkommen ^{6,7}	73 m€	40 m€	100 m€	95 m€	46 m€

In der Studie von PwC wurden bei der WES Steuersätze von 4% und 8% betrachtet, Barth und Becker legen dagegen den im GlüÄndStV verwendeten Satz von 5% zu Grunde.

Trotz dieser Unterschiede verdeutlicht Tabelle 1, dass bei PwC die RES zu einem höheren Aufkommen führt, während bei Barth und Becker die WES mehr als doppelt so ergiebig ist. Wie sind diese gegensätzlichen Ergebnisse zu erklären? Zum einen fällt auf, dass Becker und Barth bei der WES wesentlich optimistischer bezüglich der Kanalisierung in den regulierten Markt sind: Trotz des höheren Steuersatzes von 5% gehen Becker und Barth von einer Kanalisierung von 60% aus, während diese bei PwC für einen Steuersatz von 4% nur 50% beträgt. Welche Annahme realistischer ist, lässt sich schwer beurteilen. Auch die Erfahrungen aus anderen Ländern lassen sich nur schwer auf Deutschland übertragen, da neben der Besteuerung zahlreiche andere Parameter der Regulierung die Kanalisierung stark beeinflussen können.

Beide Studien kommen bei der RES trotz identischer Steuersätze zu stark unterschiedlichen Steuereinnahmen. Dies liegt zum einen an unterschiedlichen Annahmen bezüglich der Größe des Gesamtmarktes. Bei der Analyse von Barth und Becker betragen die gesamten Wetteinsätze in Deutschland 3,2 Mrd. Euro, während PwC bereits für das Jahr 2011 3,6 Mrd. unterstellen und bis zum Ende des Analysezeitraums im Jahr 2016 eine Steigerung auf 8,5 Mrd. prognostizieren. Diese Zahl mag unrealistisch hoch erscheinen. Insgesamt erscheint eine deutliche Steigerung jedoch aufgrund der unterstellten Aufhebung des Werbeverbotes realistisch.

Neben den bereits genannten Aspekten muss auch das Preissetzungsverhalten der Anbieter berücksichtigt werden.⁸ Der Gewinn π^{WES} eines Anbieters bei der WES beträgt $\pi^{\text{WES}} = R(p, W) - tW$, wobei R den Erlös, also die Wetteinsätze abzüglich der Gewinnauszahlungen

⁶ m€ steht für Millionen Euro.

⁷ Bei der Studie PwC (2011) wurde das geschätzte kumulierte Steueraufkommen für die Jahre 2012-2016 der Einfachheit halber durch vier dividiert.

⁸ Siehe auch Maschke und Schmidt (2011).

darstellt. Dieser Erlös ist von den Wetteinsätzen W sowie vom Preis p abhängig. Der Preis bei Wetten ist dabei durch die Marge des Anbieters gegeben. Je höher diese Marge ist, desto mehr verliert man durchschnittlich beim Wetten, d.h. desto teurer sind die Wetten. Als Bedingung für ein optimales Preissetzungsverhalten ergibt sich

$$d\pi^{\text{WES}}/dW = dR/dW - t = 0. \quad (1)$$

Bei der RES beträgt der Gewinn $\pi^{\text{RES}} = (1 - \tau)R(p, W)$ und die Bedingung erster Ordnung ist durch

$$d\pi^{\text{RES}}/dW = (1 - \tau)dR/dW = 0 \quad (2)$$

gegeben. Nehmen wir an, die Steuern wären so ausgestaltet, dass sie zu gleichen Preisen und Mengen führen würden. Dann ergibt Gleichsetzen von (1) und (2):

$$t = \tau dR/dW = \tau p(dR/dW)/p. \quad (3)$$

Bei unvollkommenen Wettbewerb, wie er auf dem Wettmarkt unterstellt werden kann, ist der Grenzerlös kleiner als der Preis und somit gilt $(dR/dW)/p < 1$. Dies bedeutet, dass der Steuersatz der WES t kleiner als τp sein müsste, um – wie unterstellt – zu den gleichen Wetteinsätzen zu führen. Anders ausgedrückt, führt die oben dargestellte Beziehung $t = \tau p$ nicht zu gleichen Steuereinnahmen, weil die Anbieter bei der WES einen Anreiz haben, die Preise zu erhöhen, wodurch die Wetteinsätze sinken. Dieser offenkundige Effekt wird bei der Studie von Barth und Becker nicht berücksichtigt, da sowohl bei der WES als auch bei der RES von Wetteinsätzen in Höhe von 3,2 Mrd. Euro ausgegangen wird. Insofern ist diese Studie aus ökonomischer Sicht nicht zutreffend und diskriminiert gegen die RES.

Ein weiterer wichtiger Unterschied bezüglich beider Regulierung ist der Einbezug von Online-Poker und –Casinos in das GlückG. Diese sind noch bedeutender als Sportwetten, da sie im Jahr 2010 in Deutschland einen Rohertrag von 447 Millionen Euro eingespielt haben im Vergleich zu 290 Millionen Euro bei Sportwetten (PwC, 2011). Aus Sicht des Ziels Erzielung von Steuereinnahmen ist die Besteuerung dieser Aktivitäten somit attraktiv und führt dazu, dass die Regulierung von Schleswig-Holstein in jedem Fall zu höheren Steuereinnahmen führt als der Entwurf der übrigen Bundesländer (die Zahlen in Tabelle 1 erhalten auch bei der RES nur die Steuereinnahmen aus Sportwetten). Zudem muss berücksichtigt werden, dass man Online-Poker und –Casino nicht nachträglich in den Entwurf der übrigen Länder einbeziehen könnte, da die WES zur Besteuerung dieser Aktivitäten ungeeignet ist. Dies liegt daran, dass diese Spiele durch eine sehr hohe Einsatzfrequenz gekennzeichnet sind, die im Falle der WES zu einer sehr hohen Steuerbelastung führt. Online-Casinos haben beispielsweise in der Regel nur eine Marge von

2,8%, so dass eine WES von 5% zu Verlusten führen würde (Goldmedia, 2010). Die RES ist dagegen auch zur Besteuerung dieser Spiele geeignet.

4.2 Eindämmung von Spielsucht

Bei der Analyse dieses Ziels sollte man sich zunächst vor Augen halten, dass zum jetzigen Zeitpunkt mehr als 90% des Glücksspiels im unregulierten Markt getätigt wird, wo es in der Regel keinerlei Vorkehrungen zur Suchtprävention gibt. Insofern sollte bei der Eindämmung der Spielsucht eine möglichst hohe Kanalisierung in den regulierten Markt oberste Priorität haben. Unter diesem Gesichtspunkt ist die Regulierung Schleswig-Holsteins dem Entwurf der übrigen Länder deutlich überlegen. Zwar beinhaltet der GlüÄndStV deutlich umfangreichere Maßnahmen zur Eindämmung der Spielsucht als das GlückG, jedoch können diese Maßnahmen nur im regulierten Markt greifen, während die Spieler im unregulierten Markt ungeschützt bleiben.

Eine höhere Kanalisierung ist bei GlückG zum einen aufgrund der niedrigeren Besteuerung zu erwarten, die den Wettbewerbsnachteil gegenüber nicht-lizenzierten Anbietern senkt und somit den Anreiz zur Lizenzierung steigert und auch das Wetten bei lizenzierten Anbietern attraktiver macht. Zudem dürfte auch der Einbezug von Online-Poker und -Casinos zu einer höheren Kanalisierung führen. Da diese Spiele für die Anbieter besonders gewinnträchtig sind, erhöht ihr Einbezug den Anreiz zur Lizenzierung und erlaubt durch Quersubventionierung auch das Anbieten von wettbewerbsfähigeren Quoten bei Sportwetten. Weiterhin ist zu beachten, dass falls ein Spieler ein Konto bei einem Poker- oder Casino-Anbieter hat, es nahe liegend ist, dass er dort auch seine Sportwetten tätigt. Somit senkt die Nicht-Lizenzierung von Online-Poker und -Casinos den Einsatz bei Sportwetten im regulierten Markt.

Schließlich ist natürlich auch zu beachten, dass Poker und Casinos ein eigenes Suchtpotential haben, das gemäß Meyer und Hayer (2005) wohl höher als bei Sportwetten ist. Beachtet man, dass gemäß PwC (2011) der Rohertrag bei Sportwetten im Jahr 2010 290 Millionen, bei Poker und Casinos aber 447 Millionen Euro betrug und unterstellt gemäß Goldmedia (2010) Margen von 8% bzw. 2,8%, ergeben sich Einsätze in Höhe von 3,6 Mrd. Euro bei Sportwetten und 16 Mrd. Euro bei Poker und Casinos. In Anbetracht dieser Zahlen scheint es somit dringend geboten, auch bei Poker und Casinos Maßnahmen zur Eindämmung der Spielsucht zu implementieren, was nur bei einer Kanalisierung der Einsätze in den regulierten Markt möglich ist. Diese Kanalisierung könnte durch das GlückG erlangt werden. Das GlückG sieht bisher allerdings keine besonderen Maßnahmen zum Spielerschutz im Internet vor. Möglichkeiten wären z.B. ein Authentifizierungssystem welches sicherstellt, dass Minderjährige ausgeschlossen werden, außerdem könnte so eine lückenlose, automatische Kontrolle von Spielaktivitäten festgestellt und individuelle Budgetlimits und Spielersperrern realisiert werden.

Solche Konzepte wurden unter anderem von der Kommission für Jugendmedienschutz (KJM) entwickelt und getestet und könnten nachträglich in das GlückG aufgenommen werden.

5 SCHLUSSFOLGERUNGEN

Im vorliegenden Beitrag wurden die beiden vorgeschlagenen Gesetze zur Regulierung des Glücksspiels in Deutschland, der GlüÄndStV und das GlückG, aus ökonomischer Perspektive betrachtet. Es wurden zunächst zwei Ziele abgeleitet, die mit der Regulierung des Glücksspiels verfolgt werden sollten, die Erzielung von Steuereinnahmen und die Eindämmung der Spielsucht. Die Erreichung beider Ziele erfordert eine möglichst hohe Kanalisierung in den regulierten Markt, da sich nur hier Steuereinnahmen generieren und Maßnahmen zur Eindämmung der Spielsucht implementieren lassen. Beim GlückG kann aufgrund der wettbewerbsfähigeren Steuersätze, aber auch durch den Einbezug von Onlie-Poker und -Casinos mit einer deutlich höheren Kanalisierung gerechnet werden.

Insgesamt erscheint das GlückG dem GlüÄndStV deutlich überlegen. Insbesondere erscheint es aus Sicht beider Ziele nahezu absurd, dass Poker und Casinos beim GlüÄndStV nicht in die Regulierung einbezogen werden, da diese ein hohes Suchtpotential haben und im Vergleich zu Sportwetten die Generierung höherer Steuereinnahmen erlauben. Dabei ist zu beachten, dass die im GlüÄndStV vorgesehene Wetteinsatzsteuer nicht bei Poker und Casinos anwendbar ist, da sie aufgrund der hohen Einsatzfrequenz zu einer sehr starken Steuerbelastung führen würde. Insofern lassen sich Poker und Casinos im GlüÄndStV auch nicht nachträglich einbeziehen, was für die Rohertragssteuer im GlückG spricht.

Ein möglicher Vorteil des GlüÄndStV ist die Tatsache, dass hier weitaus restriktivere Maßnahmen zur Eindämmung der Spielsucht wie Werbeverbote, Beschränkung des Wettangebotes und Begrenzung der Einsätze vorgesehen sind. Solche Maßnahmen ließen sich ohne Probleme auch im GlückG implementieren. Ob dies gerechtfertigt ist, lässt sich aus ökonomischer Sicht schwer beurteilen. Es ist jedoch zu beachten, dass gerade die Beschränkung des Wettangebotes und die Begrenzung der Einsätze den Anreiz erhöhen, bei nicht-lizenzierten Anbietern ohne diese Einschränkungen zu spielen, was dem Ziel der möglichst hohen Kanalisierung zuwider läuft.

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PART II

PAPER 3: INSURANCE DEMAND AND SOCIAL COMPARISON: AN EXPERIMENTAL ANALYSIS

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Abstract

This paper analyzes whether social comparison can explain the low take-up of disaster insurance usually reported in field studies. We argue that risks in the case of disasters are highly correlated between subjects whereas risks for which high insurance take-up can be observed (e.g. extended warranties or cell phone insurance) are typically idiosyncratic. We set up a simple model with social reference points and show that in the presence of inequality aversion social comparison makes insurance indeed less attractive if risks are correlated. In addition we conducted a simple experiment which confirms these theoretical results. The average willingness to pay for insurance is significantly higher for idiosyncratic than for correlated risks.

Key words: disaster insurance, social reference points, loss aversion, inequality aversion

JEL classification: C91, D03, D14, D81, G22

1 INTRODUCTION

A major puzzle in insurance economics is the fact that people underinsure low-probability events with high losses. It is well documented that many people do not take up disaster insurance even though premiums are often subsidized (Kunreuther et al. 1978; Kunreuther and Pauly 2004). A very prominent example for this type of behavior is flood insurance in the USA. At the same time, many people insure modest risks at highly loaded premiums, e.g. extended warranties, cell phone insurance or low deductibles for home insurance. Sydnor (2010) for example analyzes a sample of 50,000 home insurance policies with either a \$500 deductible or a \$1000 deductible. The average extra premium for the low deductible policy was \$100. Given a claim rate of 5%, the average extra value of the low deductible policy was only \$25. Interestingly, the majority of homeowners preferred the low deductible policy. Fitting the demand for low deductibles to expected utility leads to implausible high degrees of risk aversion (Sydnor 2010), which shows that expected utility theory cannot explain the observed choice patterns.

Apart from these field studies, experimental evidence also shows that insurance take-up increases with the probability of a loss (Slovic et al. 1977; McClelland et al. 1993; Ganderton et al. 2000). In an attempt to explain the observed behavior, Slovic et al. (1977) propose that there is a probability threshold below which an individual considers the probability to be zero. Similarly, Camerer and Kunreuther (1989) argue that low probability events are not well perceived; subjects either dismiss low probabilities or overestimate them. In two experiments on insurance demand McClelland et al. (1993) observe a bimodal distribution with some subjects bidding zero and others bidding much more than the expected value. However, Laury et al. (2009) argue that results of previous experiments may be due to confounds in the experimental design, in particular the lack of monetary incentives. Fixing these design issues, they observe precisely the opposite evidence, i.e. insurance take-up is actually decreasing with the probability of losses. This conflicting evidence raises doubt about whether the misperception of low probabilities plays a key role in the observed choice patterns.

An alternative explanation for the low take-up of disaster insurance is an expected government bailout in case of disasters, which creates a type of samaritan's dilemma situation. Homeowners that believe they will be helped by disaster assistance *ex post*, will be less likely to take up insurance against the risk *ex ante*. Yet, the postulated negative relationship between disaster insurance and disaster assistance has empirically not been found valid (Kunreuther et al. 1978). Browne and Hoyt (2000), using data from the United States' National Flood Insurance Program, even find a positive relationship between insurance take-up and disaster assistance in the USA.

This paper provides and tests a new explanation for the low take-up of disaster insurance based on social comparison. One fact mostly overlooked until now is that the two situations, disaster insurance and e.g. cell phone insurance, do not only differ in the probability of losses but also in the correlation of risks. A flood (and also other natural disasters) will most likely not only affect you, but also your neighbors and peers. It can be considered to have highly correlated risks. Events that entitle one to compensation for cell phone insurance are hardly correlated with neighbors or peers. Hence, they can be considered as idiosyncratic risks. The same seems to hold for extended warranties or home insurance. While nearly everybody incurs a loss in the case of correlated risks, an unlucky person is typically the only one losing in the case of idiosyncratic risks. It has been shown in many studies (e.g. Fehr and Schmidt 2006) that the social context can serve as a reference for our subjective well-being. If we do not only care for absolute wealth but also for our wealth relative to peers, the correlation of risks may have a strong impact on insurance decisions.

Having in mind that the social context may play a vital role for decisions under risk we examine both theoretically and experimentally how the correlation of risks influences insurance decisions. We claim that insurance is less attractive for correlated than for idiosyncratic risks. This is theoretically shown in a simple model with a social reference point. Furthermore, we conduct an experiment, which shows that the willingness to pay for insurance is significantly lower for correlated than for idiosyncratic risks.

The rest of the paper is organized as follows. In Section 2 we set up the empirical and theoretical background. Section 3 analyzes in a simple insurance demand model how insurance take-up is influenced by the correlation of risks among subjects. We consider inequality aversion and also allow for strategic interaction between subjects. Our experimental design is presented in Section 4. In order to observe decisions under risk in situations where risks are either idiosyncratic or correlated, participants were presented with the choice to take up insurance against a possible loss. While in one treatment the risk to lose was idiosyncratic, it was perfectly correlated among participants in the other treatment. In Section 5 we describe our main experimental findings and Section 6 concludes.

2 EMPIRICAL AND THEORETICAL BACKGROUND

Under expected utility theory a risk averse subject will buy full insurance if and only if premiums are fair, i.e. equal expected losses. This excludes not taking up subsidized disaster insurance or full cellular phone insurance at highly loaded premiums. Also, fitting the demand for low deductibles to expected utility leads to implausible high degrees of risk aversion (Sydnor 2010). The standard theory of decision making under risk is thus not able to explain the observed

choice pattern of high insurance take-up for modest risks and low take-up for small risks. This is just one of a variety of observed choice patterns that contradict expected utility theory, which have induced the development of alternative theories that attempt to explain these deviations (Starmer 2000). Some of these theories imply that either full insurance is demanded also at unfair premiums or less than full insurance at fair premiums (see e.g. Schlesinger 1997). However, they are not able to explain diverging behavior for correlated and uncorrelated risks.

Experiments have shown that choices vary depending on whether outcomes are coded as gains or losses. It is empirically well established that people are significantly more averse to losing a certain amount than they are attracted to winning that same amount (e.g. Loewenstein and Adler 1995; Gneezy and Potters 1997). This phenomenon is referred to as loss aversion and was first introduced by Kahneman and Tversky (1979). In prospect theory loss aversion is captured by imposing that the utility function is steeper for losses than for gains. A second manifestation of reference dependence in prospect theory is diminishing sensitivity. Diminishing sensitivity demands that marginal utility is decreasing as one moves away from the reference point which implies that the utility function is concave (convex) for gains (losses).

For application of reference dependent theories the determination of an appropriate reference point is crucial. In most cases, the reference point is assumed to be the status quo, like current income or wealth (e.g. Rabin 2000; Samuelson and Zeckhauser 1988) or the price of an asset (Odean 1998). Some models derive the reference point endogenously by modeling expectations-based reference points (e.g. Köszegi and Rabin 2006; Gill and Prowse 2012). Also theories with state dependent reference points have been proposed (e.g. Sugden 2003; Köszegi and Rabin 2006; Schmidt et al. 2008; Trautmann et al. 2011). This allows us to analyze situations where a fixed (i.e. state independent) reference point is implausible since the status quo is state dependent. In particular when buying insurance, initial wealth is state dependent and hence modeling the status quo as reference point requires state dependence (Schmidt 2012).

In the discussion so far the social context has been omitted. Most economic decisions are not made in isolation. Tversky and Kahneman (1992) suggest that a reference point may not solely depend on the decision maker's status quo but may also be influenced by social comparison which generates social reference points. In social comparison, loss aversion could be observed in the sense that people are more affected by being worse off than others than being better off than others. While there is clear evidence that disadvantageous inequality (being worse off) decreases utility (e.g. Shamy-Tsoory et al. 2007) there is contradicting evidence on how utility is influenced by advantageous inequality (being better off). Some empirical findings suggest that comparison to less fortunate subjects enhances subjective well-being (Buunk 2007; Wills 1981). However, there is also evidence that people dislike this kind of inequality and care about the

equality of the payoff distribution (e.g. Camerer and Thaler 1995). Fehr and Schmidt (1999) for example model a simple utility function where disadvantageous inequality has a strong effect and advantageous inequality a relatively weaker negative effect on a subject's utility.

While there is ample research on social comparison and decision making in a social context, applications to risky situations are still rare (see Trautmann and Vieider 2012 for an overview of the recent literature). Linde and Sonnemans (2012) find that individual decision making is influenced by social comparison in a way that contradicts diminishing sensitivity. They conducted experiments where participants had to choose between lotteries while a peer was facing a fixed payoff. Participants were more risk averse in the loss domain (possibility to earn at most as much as the peer) than in the gain domain (at least as much as the peer). Vendrik and Woltjer (2007) investigate whether utility derived from relative income displays diminishing sensitivity. They estimate a utility function with respect to relative income from a large German panel and find that it is concave in the loss and gain domain. They explain the concavity in the loss domain by increasing marginal costs for subjects to participate in social activities of their peer group. While both the studies of Linde and Sonnemans (2012) and Vendrik and Woltjer (2007) reject diminishing sensitivity in the presence of social reference points, they report evidence in favor of loss aversion. In contrast, Bault et al. (2008) find the opposite of loss aversion (i.e. gain seeking) in the presence of social reference points. Their result relies however on rating of emotions by subjects and a model that does not precisely resemble prospect theory. Another related experimental study was done by Rohde and Rohde (2011) examining how participants' decisions for lotteries were affected by the risk a peer group faced. They find that people prefer risks to be distributed idiosyncratically rather than correlated.

Altogether, these studies show that social comparison can have a strong impact on decisions under risk. Since the social reference point for insurance problems differs considerably for correlated and idiosyncratic risks, insurance demand may be significantly influenced by correlation. The next section shows within a simple model with inequality aversion that insurance is indeed less attractive for correlated risks, which could explain the low take-up of disaster insurance. Given the rejecting evidence concerning diminishing sensitivity in the social context, we consider a piecewise-linear utility function and analyze the impact of inequality aversion.

3 THE MODEL

The goal of this section is not to provide a general and comprehensive analysis of insurance demand in the presence of social comparison. Instead, we want to show in a rather simple model that social reference points may decrease the attractiveness of insurance for correlated risks and

thereby motivate the experimental study presented in the subsequent sections. We consider a model with two individuals and two states of the world, in one of which a loss occurs. The two individuals maximize their utility taking the other person's wealth as a reference point and are inequality averse. We allow this social reference point to vary depending on the state the other individual is in. There is the possibility to buy full insurance against the loss at an actuarially fair premium. We consider two cases. In case 1 risks are uncorrelated among subjects. A loss can thus occur to both subjects, to one only or to none. This would be the case of theft insurance or extended warranties for example. In case 2 risks are perfectly correlated and therefore, either both or none is affected by a loss. This would mirror natural disasters, like floods or storms, which affects many people in one region.

We start with a basic model, where we consider the utility of one subject only. Her utility depends on her own income and that of a peer. Afterwards, we relax this assumption and allow for strategic interaction between the two individuals.

3.1 The Basic Model

Individuals are denoted by A and B both with initial wealth y . With probability p a loss L occurs. In the absence of an insurance contract final wealth for A and B is therefore given by y with probability $1-p$ and $y-L$ with probability p . We analyze the decision of individual A who has the possibility to take up full insurance at the actuarially fair insurance premium pL . Buying insurance results in a final wealth of $y-pL$ independent of which state of the world occurs. A's social reference point is the final wealth of B and therefore depends on A's expectations whether B takes up insurance or not. If B is fully insured the correlation of risks is immaterial, as B does not face any risk in this case. Therefore, in this section we assume that A expects B to be uninsured. This assumption will be relaxed in the next subsection.

In order to focus on inequality aversion and in view of the evidence reported in the preceding section, we take the utility function of Fehr and Schmidt (1999) where disadvantageous inequality (being worse off than a peer) has a strong effect and advantageous inequality (being better off) a relatively weaker negative effect. In the two-player case the utility function for A is given by

$$U^A(x^A, x^B) = x^A - \alpha^A \max\{x^B - x^A; 0\} - \beta^A \max\{x^A - x^B; 0\} \quad (1)$$

where x^j is the final wealth of individual j and with $\beta < \alpha$ and $0 \leq \beta < 1$. We now consider the utility derived from insurance take-up in the two cases – idiosyncratic and correlated risks.

3.1.1 Case 1 - Idiosyncratic risks

In case of idiosyncratic risks a loss can occur to A only, to B only, to none or to both. A's utility is therefore given by

$$U_I^A = (1-p)^2 u^A(x_1^A, x_1^B) + (1-p)p u^A(x_1^A, x_2^B) + p(1-p) u^A(x_2^A, x_1^B) + p^2 u^A(x_2^A, x_2^B), \quad (2)$$

where x_j^i reflects the final wealth of individual j in state i . If A takes up insurance, final wealth of A is given by $y-pL$ independent of the state. Final wealth of B is state dependent and given by y with probability $1-p$ and $y-L$ with probability p . A's utility is then given by

$$U_I^{A,Ins} = y - pL (1 + \alpha + \beta - p\alpha - p\beta). \quad (3)$$

On the other hand if A does not take up insurance, her wealth is state dependent as well. A's utility then amounts to $U^A = (1-p)^2 y + (1-p)p(y-\beta L) + p(1-p)(y-L-\alpha L) + p^2(y-L)$ which reduces to

$$U_I^{A,No} = y - pL (1 + \alpha + \beta - p\alpha - p\beta). \quad (4)$$

Comparing (3) and (4) reveals that buying insurance (3) or not results in the same utility level for A. Therefore, she is indifferent between taking up insurance or not if risks are uncorrelated.

3.1.2 Case 2 - Correlated risks

If risks are correlated, there are two states of the world, which affect both subjects. A loss can occur to both A and B, or to none and A's utility is therefore given by

$$U_C^A = (1-p) u^A(x_1^A, x_1^B) + p u^A(x_2^A, x_2^B). \quad (5)$$

If A takes up insurance her utility yields $U^A = (1-p)(y-pL-\alpha^A pL) + p(y-pL-\beta^A(1-p)L)$ which reduces to

$$U_C^{A,Ins} = y - pL (1 + \alpha + \beta - p\alpha - p\beta). \quad (6)$$

If A does not take up insurance, wealth of A and B equals y in state 1 and $y-L$ in state 2. Therefore, if A refrains from taking up insurance her utility amounts to

$$U_C^{A,No} = y - pL. \quad (7)$$

A's utility level is now lower with insurance than without. Thus, it is rational for A not to take up insurance if risks are correlated.

Comparing idiosyncratic and correlated risks, this simple insurance demand model shows that insurance becomes less attractive when risks are correlated among subjects. Subjects are indifferent between taking up insurance or not if risks are uncorrelated, while they do not buy insurance if risks are correlated.

3.2 Strategic interaction

So far, there was no strategic interaction between subjects, as we assumed that subject A bases her decision on the expectation that B is uninsured. This assumption can easily be relaxed to a setting where A and B strategically interact. A and B derive their utility relative to a social reference point, namely the other subject's state dependent wealth. In analogy to A, B's utility function is given by

$$U^B(x^B, x^A) = x^B - \alpha^B \max\{x^A - x^B; 0\} - \beta^B \max\{x^B - x^A; 0\} \quad (8)$$

with $\beta^B < \alpha^B$ and $0 \leq \beta^B < 1$.

3.2.1 Case 1 - Idiosyncratic risks

Again, we first consider the idiosyncratic case. When faced with the decision of taking up full insurance, A and B take the other subject's insurance decision into account. Utility levels of A and B resulting from the four possible cases – both insured, one insured, both not insured – are displayed in Table 1. It is rational for both subjects to take up insurance and (Insured, Insured) therefore constitutes a Nash equilibrium.

Table 1: Strategic interaction and idiosyncratic risks

		B	
		Insured	Not insured
A	Insured	$U^A = y - pL,$ $U^B = y - pL$	$U^A = y - pL (1 + \alpha^A + \beta^A - p\alpha^A - p\beta^A),$ $U^B = y - pL (1 + \alpha^B + \beta^B - p\alpha^B - p\beta^B)$
	Not insured	$U^A = y - pL (1 + \alpha^A + \beta^A - p\alpha^A - p\beta^A)$ $U^B = y - pL (1 + \alpha^B + \beta^B - p\alpha^B - p\beta^B)$	$U^A = y - pL (1 + \alpha^A + \beta^A - p\alpha^A - p\beta^A)$ $U^B = y - pL (1 + \alpha^B + \beta^B - p\alpha^B - p\beta^B)$

3.2.2 Case 2 - Correlated risks

We now turn to the case of correlated risks in Table 2. This situation exhibits two equilibria (Insured, Insured) and (Not insured, Not insured). The optimal strategy now depends on the expected behavior of the other subject. Compared to the idiosyncratic case, where (Insured, Insured) was the unique equilibrium, insurance becomes less attractive in the case of correlated risks. Thus, our results from the basic model also hold with strategic interaction.

Table 2: Strategic Interaction and correlated risks

A \ B	Insured	Not insured
Insured	$U^A = y - pL,$ $U^B = y - pL$	$U^A = y - pL (1 + \alpha^A + \beta^A - p\alpha^A - p\beta^A),$ $U^B = y - pL (1 + \alpha^B + \beta^B - p\alpha^B - p\beta^B)$
Not insured	$U^A = y - pL (1 + \alpha^A + \beta^A - p\alpha^A - p\beta^A),$ $U^B = y - pL (1 + \alpha^B + \beta^B - p\alpha^B - p\beta^B)$	$U^A = y - pL,$ $U^B = y - pL$

The rationale for our theoretical results is rather simple: In the case of idiosyncratic risks full insurance of both subjects is the only way to avoid utility reducing inequality. In contrast, for correlated risks inequality can also be ruled out if both subjects are uninsured.

3.3 Generalizations

Our simple model could be generalized at least in two aspects. First, risks may not be perfectly correlated but only correlated to a certain degree. Second, in contrast to the model of Fehr and Schmidt, deviations from the income of the other subject may be evaluated in a non-linear way. With respect to the first point, note that in our setup with only two subjects and two possible outcomes less than perfect correlation can be modeled in a way that risks are perfectly correlated with a certain probability μ and otherwise uncorrelated. The payoff matrix in this case could then be easily constructed by taking the convex combination of outcomes in Table 1 and 2 for each cell for the given value of μ . This would result in two Nash equilibria, (Insured, Insured) and (Uninsured, Uninsured) where the first equilibrium with payoffs $(y-pL, y-pL)$ Pareto-dominates the second one. Nevertheless, taking up insurance for one subject is unattractive if the other subject is uninsured since $y-pL-pL(1-p)(\alpha+\beta) < y-pL-(1-\mu)pL(1-p)(\alpha+\beta)$. This shows that both subjects not taking up insurance is a stable equilibrium.

As shown by Schmidt (2016), the second point is rather complex. Schmidt analyzes insurance demand under prospect theory for different reference points. As the state-dependent incomes of the other player form a kind of reference point in the present model, the mathematical structure is rather similar. According to Schmidt (2016) insurance demand under prospect theory is very sensitive to the functional form of the value function and characterized by corner solutions if the standard value function of Tversky and Kahneman (1992) is employed. Given these complexities, we will refrain from analyzing non-linear utilities here.

4 EXPERIMENTAL DESIGN

Our experiment is designed to observe insurance take-up in situations where risks are either idiosyncratic or correlated. All experimental sessions were conducted in Kiel with a total of 149 students participating. The experiment was paper-based and performed in classrooms with altogether eight groups. Each session lasted about 15 to 20 minutes. Students usually knew each other in advance as they had spent a reasonable amount of time studying together. By having the chance to win more or less than their peers, subjects were likely to feel more or less satisfied with their individual outcome when comparing themselves to the others. Consequently, social comparison may influence behavior in our setting.

Subjects received an initial endowment of €10. This endowment could be lost with probability $p=0.5$ and it was possible to buy full insurance at varying premiums for this potential loss. There were two treatments. In treatment I the individual risk to lose the endowment was independent from that of the other subjects. In treatment C the risk to lose was correlated among the group, i.e. either there was a loss for everyone or no one. Four groups participated in treatment I and another four in treatment C. The groups were not aware that there existed other treatments or other groups. Since subjects decide simultaneously without any information about behavior of other subjects, each individual decision can be regarded as an independent observation. After reading out aloud the instructions, sheets were handed to the participant including the instructions and choice lists.

In order to elicit the individual willingness to pay (WTP), each participant was asked to indicate whether they would buy full insurance in a choice list consisting of ten different prices. They were told that only one of these prices was relevant for payment. This price was identical for all subjects and determined by drawing a ball from an urn. As subjects did not know which one was relevant in advance, they should decide for each price as if it was relevant. The WTP in this case reflects that premium which makes a subject indifferent between taking up full insurance and no insurance at all. It equals the expected loss (i.e. €5 in our experiment) for risk neutral subjects, while it is higher (lower) than the expected loss for risk averse (seeking) subjects. Also, the higher the degree of risk aversion the higher the WTP.

The price range was between €4.00 and €6.25, see Table 3. This means that buying insurance would result, depending on the price relevant for payoff, in a sure payoff between €6.00 and €3.75, while not buying insurance for the relevant price results in either keeping the €10 or losing them. Since the price became more expensive with each step, insurance became less attractive and individuals should switch from buying insurance to not buying insurance at some point according to their risk preferences. The switching point indicates the WTP in order to be insured against the loss. Table 3 gives an overview of the experiment. The experiment involved a

second choice problem identical to the one explained above. The only difference was that the loss probability is ambiguous. Details are explained in Section 5.2. A coin flip determined whether the risky or the ambiguous situation was relevant for the payoff.

Table 3: Overview of the Experiment

	Treatment I	Treatment C		
Instructions	Initial endowment $y = €10$ Individual loss with probability $p = 0.5$	Initial endowment $y = €10$ Loss for entire group with probability $p = 0.5$		
	Possibility to buy full insurance for price $c(i), i=1, \dots, 10$			
Private Decision Making	Ball no.	Price of insurance	Will you buy insurance?	
			YES	NO
	1	4.00		
	2	4.25		
	3	4.50		
	4	4.75		
	5	5.00		
	6	5.25		
	7	5.50		
	8	5.75		
	9	6.00		
10	6.25			
Payoff	Random determination insurance price relevant for all subjects			
	Individual determination of the state (loss or not) Individual payoff according to state and relevant insurance decision i	Determination of the state (loss or not) for the entire group Individual payoff according to state and relevant insurance decision i		
No. of participants	78	71		

5 RESULTS

5.1 Comparison between correlated and idiosyncratic risks

Out of the 149 participants, 61 have a WTP of €5. Another 36 subjects are willing to pay more than this and are considered to be risk averse, while 52 are willing to pay only less and are considered to be risk seeking. Most participants switch from buying insurance to not doing so, but some do not switch at all. At one extreme, there are 22 individuals, who take up insurance

for all given prices and are therefore considered to be very risk averse. At the other extreme, there are 20 participants that are not willing to buy insurance for the lowest price offered and thus do not buy insurance at all. These have a very low WTP and are considered to be risk lovers. As Table 4 shows, 73% of the participants take up insurance at the fair premium (€5) in treatment I, while only 56% do so in treatment C. This makes a difference of 17 percentage points in insurance take-up between idiosyncratic and correlated risks. It is approximately of the same magnitude as the difference in insurance take-up if the probability of losing switches from 0.1 to 0.01 (with same expected loss) reported by Laury et al. (2009).

Table 4: Insurance take-up

WTP	Overall	Treatment C	Treatment I
< €5	34.9%	43.7%	26.9%
= €5 (fair premium)	40.9%	40.8%	41.0%
> €5	24.2%	15.5%	32.1%

The average switching points from buying insurance to not buying insurance on a scale from 0 to 10 amounts to 5.38 for idiosyncratic risks and 4.14 for correlated risks. This corresponds to an average WTP of €5.35 for full insurance in case of uncorrelated risks, whereas subjects are only willing to pay €5.04 if risks are correlated. The difference in the WTP is therefore €0.31 which amounts to 6.2% of the expected loss. A Wilcoxon rank-sum test confirms that the average switching points for treatment I and C are indeed significantly different at the 1% level (z -stat = -2.638, $p = 0.0083$).

To account for possible confounding effects, we additionally run Tobit regressions with the switching point from buying to not buying insurance as our dependent variable and treatment as the main independent variable, see Table 5. The variable treatment is a dummy that is one for subjects that play under correlated risks. We further include gender, peer group size, and culture as additional explanatory variables. No statistically significant effects can be found for these variables and the initial findings are supported. We further check if males and females respond equally to social comparison. Individual regressions for men and women point to the direction of gender differences in the treatment effects. To test if the treatment effect is actually different for men and women, we run an additional regression that includes an interaction term - treatment x gender. Indeed the treatment effect seems to be stronger for men but is still significant for women.

Table 5: Tobit regressions

Variable	Model 1	Model 2
Treatment (1 if risks are uncorrelated)	1.620** (0.676)	2.673*** (1.018)
Gender (1 for females)	0.016 (0.671)	1.21 (0.896)
Peer group size (1 if peer group is larger than 12)	-0.128 (0.682)	-0.361 (0.683)
Culture (1 if foreign, i.e. not born in Germany)	-1.137 (1.092)	-1.442 (1.102)
Interaction (treatment x gender)		-2.225* (1.264)
Constant	5.141	4.782

Numbers in parentheses are robust standard errors.
One, two, and three stars stand for 10%, 5% and 1% significance levels.

Our results suggest that participants are willing to pay less for insurance if the loss occurs for the entire group than if the risk is distributed independently. This indicates that the distribution of risks is taken into account for individual insurance decisions.

5.2 Comparison between risk and ambiguity

In addition to the risky situation, where a loss occurred according to the outcome of throwing a die, we also considered an ambiguous situation where a loss occurred when drawing a red card from a deck with an unknown proportion of red and black cards. Since the seminal work of Ellsberg (1961), it is well known that people usually prefer to bet on risky rather than ambiguous lotteries (see Camerer and Weber 1992 for an overview of the literature). In our experiment subjects were faced with the risky situation first and were then asked to decide on the ambiguous situation, i.e. every subject had to make two choices. Concerning the outcome of the difference between treatments I and C the findings are similar to the risky situation and show the robustness of the previous findings (average switching points are 5.25 for treatment C and 6.37 for treatment I, and a Wilcoxon rank-sum test confirms the difference ($z\text{-stat}=-1.866$, $p=0.0621$)).

Our decision to present the ambiguous situation after the risky one is motivated by the comparative ignorance hypothesis of Fox and Tversky (1995). According to this hypothesis, ambiguity aversion is most pronounced if subjects can compare risky and ambiguous alternatives. We conducted a Wilcoxon signed-rank test to see whether we find a difference in the WTP between the risky and the ambiguous situations, but a statistical difference was found neither for treatment I nor for treatment C. On the one hand this comes as a surprise as participants in our experiment are faced with the risky situation first and due to the comparative

ignorance hypothesis our order makes a difference between risk and ambiguity most likely. On the other hand our findings are in line with other studies which show that, in contrast to the gain domain, ambiguity aversion is not as pronounced or not present at all in the loss domain (e.g. Trautmann et al., 2015).

6 CONCLUSIONS

A major puzzle in insurance economics is the low take-up of disaster insurance, even at subsidized premiums. Evidence for existing explanations of this puzzle is contradictory and so far, there is no convincing theory for this phenomenon. In this paper we analyzed whether social comparison can serve as an alternative explanation. An emerging literature shows how social reference points influence decisions under risk. Linde and Sonnemans (2012) for example find that individual decision making is strongly influenced by social comparison in a way that stands in contradiction to the hypothesis of diminishing sensitivity proposed in prospect theory. Social reference points may thus influence risk taking in general and insurance take-up in particular. We examine the influence of social comparison on insurance decisions both theoretically and experimentally. More specifically, we analyze how the correlation of risks among subjects influences insurance decisions and find that in theory the presence of a social reference point makes insurance less attractive for correlated than for idiosyncratic risks if inequality aversion holds. This result is clearly confirmed by our experiment. In this sense our evidence is consistent with social preferences as modeled by Fehr and Schmidt (1999).

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PAPER 4: THE RISKY SHIFT PHENOMENON IN GROUP DECISIONS: DOES GENDER MATTER?

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Abstract

Since the early sixties, it has been shown that groups often take higher risks than individuals (risky shift phenomenon). This result has been challenged by recent studies which predominantly observed cautious shifts when experimental designs with real monetary incentives are employed. Here we analyze to which extent the direction of the group shift depends on the gender composition of groups. We derive a gender-specific polarization hypothesis which states that, compared to individual preferences, male dominated groups will shift towards higher risk taking than female dominated ones. Our experimental tests reveal a systematic impact of gender composition on group shifts which supports our hypothesis.

Key words: risky shift, group decisions, gender, monetary incentives

JEL classifications: C91, D81, J16

1 INTRODUCTION

Since the seminal work of Stoner (1961), the difference between individual and group decisions has been an intensively debated issue in social psychology. A stylized fact is the “risky shift” which means that groups in most cases take higher risks than individuals (Kogan and Wallach, 1967). As group discussions tend to reinforce preferences of group members (group polarization) also cautious shifts can be observed if individual degrees of risk aversion are relatively high (Pruitt, 1971). This evidence is originally based on studies employing choice dilemma questionnaires. In recent years, several studies analyzed group decisions under risk with monetary incentivized experiments. Depending on risk types and elicitation mechanisms, the predominant finding in those studies is that groups take less risk than individuals, i.e. a cautious shift (Masclot et al., 2009; Baker et al. 2008; Shupp and Williams, 2008; Pahlke et al., 2012).

The present paper adds to this literature by investigating the impact of gender composition on group decisions under risk. Surprisingly, to the best of our knowledge no previous study systematically analyzed whether the incidence of risky and cautious shifts is affected by the gender composition of groups. Based on the “risk as value” hypothesis of Brown (1965) we propose a gender-specific polarization hypothesis which states that, relative to individual preferences, male dominated groups shift towards higher risk taking than female dominated ones. We test this proposition with a simple lottery choice experiment under monetary incentives. Our results show a clear and significant pattern which supports this hypothesis.

Among alternative hypotheses to explain the risky shift phenomenon, the risk as value hypothesis has received most support (Vidmar, 1970; Bauer and Turner, 1974). It proposes that (moderate) risk taking is a socially approved trait. When some subjects learn during the group decision process that they are more risk averse than others they question whether their intended choices are in line with the cultural norm. Therefore, the risk shift is caused by the more risk averse subjects revising their proposed choices to higher riskiness. In our view, risk tolerance is a cultural norm, particularly for men and to a much lower degree for women. Therefore, we hypothesize that mainly men increase their risk tolerance if they have to reveal their preferences in a group context. Strong support for our view is provided by the experiment of Daly and Wilson (2001). They compare risky decisions made in private with those made in public where subjects have to announce their individual choice in front of a group of peers. It turned out that men took significantly more risk in the public than in the private condition, whereas there was no effect for women. Transferring this result to group decisions implies that a risky shift is due to male members and enhanced by their share in the group.

We formalize our gender-specific polarization hypothesis more precisely in Section 3. Before, we will describe our experimental design in Section 2. Presentation of results in Section 4 is followed by a discussion in Section 5.

2 EXPERIMENTAL DESIGN

2.1 Participants and Procedure

The experiment was carried out in July 2015 at the student canteen of the University of Kiel, Germany. During three days 255 people participated in our study. The gender ratio was balanced (50.6% females) and average age was 23.95 (SD 4.61). Recruiters invited customers of the canteen to take part in an economic experiment. Potential participants were told that they will receive a €2 participation fee and could gain additional money by playing a lottery. Groups of three people were formed, discreetly varying the group's gender composition and requiring that group members were not familiar to each other. All other group characteristics were randomly allocated¹. Overall, there were 22 purely female groups (further mentioned as FFF), 21 groups with two women and one man (FFM), 21 groups with one woman and two men (FMM) and 21 purely male groups (MMM), an overview is given in Table 1.

Table 1: Gender composition of groups

<i>Gender composition</i>	<i>Number of groups</i>	<i>Number of participants</i>
FFF	22	66 women
FFM	21	42 women; 21 men
FMM	21	21 women; 42 men
MMM	21	63 men
Overall	85	255

As the groups were formed, it was explained to the participants that they had to take a risky decision as a group first, then had to fill out a questionnaire on their own and in the end had to reunite in their initial group to receive their payment. After the groups were formed a card showing six alternative lotteries was handed to them (see Figure 1). Participants were told that the group had to choose exactly one of these lotteries by consensus. There were no time constraints for discussion and reaching consensus (no group took longer than 5 minutes to reach a consensus). When participants within a group agreed on a lottery, they stated their choice to the experimenter and were handed the questionnaires, which had to be filled out in private. The questionnaire included an individual risk preference task (which equaled the group task with all amounts divided by three), basic demographic questions (gender, age, highest

¹ Randomization was successful and only small significant differences between groups were found, see Table A2 and A3 in the Appendix.

educational degree, amount of siblings), happiness (self-reported happiness on a five point Lickert scale), and questions on the Big Five personality traits. After filling out the questionnaires participants reunited in their groups. To determine the payoff a coin was flipped twice. The first coin flip indicated whether the group or the individual lottery choice would be relevant for payment. The second coin flip determined the outcome – high or low payoff - according to either the group or individual choice.

2.2 Methods

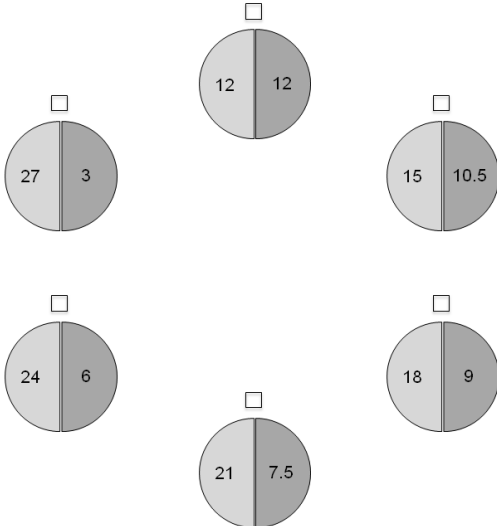
2.2.1 Risk preferences

To elicit risk preferences, a well-established task developed by Eckel and Grossman (2002) was used. The groups had to choose by consensus exactly one out of six lotteries depicted in Figure 1. The lotteries were represented with coins that had two colored sides indicating the size of a gain (in Euro) – orange (high gain) and pink (low gain). For all six lotteries, chances to win the high or low gain were equal (50% probability). The lotteries increased in risk and expected value starting from lottery 1 with a sure gain of €12 (or €4 for each group member) to lottery 5 with an expected value of €15 (€8 or €2 for each group member). Lottery 6 had the same expected value as lottery 5 but higher risk (€27 or €3) and allows to detect risk loving attitudes. The number of the chosen lottery by the group will be referred to as group choice (GC) in the sequel. In general, the higher GC the lower is the degree of risk aversion of the given group. To control for individual risk preferences the questionnaire included the same lottery task, but with individual gains (i.e. group amount divided by 3). Responses to this task will be termed individual choice (IC). Again, a higher number of IC indicates a lower degree of risk aversion. The group shift is given by $GC - IC$ where $GC - IC > (< 0)$ indicates a risky (cautious) shift.

A critical feature of experimental designs to analyze group polarization is the order of elicitation of individual and group choices. Most of the previous studies elicited individual preferences first. We deliberately reversed this order but are aware that both procedures have their pros and cons. In general, if a subject has to make more than one evaluation, the former evaluations will serve as anchor which can bias the later ones (Ariely et al., 2003). This seems to favor the procedure of eliciting individual preferences first. Recent evidence shows, however, that also individual decisions are heavily influenced by the social context, in particular by the gender composition. Castillo et al. (2015) for instance, let subjects make individual risk taking decisions while sitting in a room with other people. Although the decisions are fully private and not revealed to other subjects, the gender composition in the room has a systematic impact on individual preferences. Consequently, also in the case of group decisions the gender composition of the group will influence individual risk preferences. This effect is, however, at least reduced if subjects anchor on their individual decision they made before in private, i.e. without any

influence of the social context. In our view, the social context is an important determinant of group decisions which motivated us to have the group decision first. We test whether the group composition has a systematic impact on the individual preferences elicited in the second step and found no significant effects (see Section 4). Also Harrison et al. (2010) show that the order between group and individual decisions has no influence on individual risk preferences.

Figure 1: Lotteries for group decision-making



2.2.2 Personality traits

To control for specific characteristics of participants, which might influence the consensus building process for the group decision, we included questions on the so called Big Five personality traits. These are aimed to reveal five dimensions of personality: extraversion, agreeableness, conscientiousness, neuroticism and openness to experience. They were measured by self-reports of the NEO Five-Factor Inventory using 60 items, i.e. 12 items per domain (Costa and McCrae, translated in German by *von Borkenau and Ostendorf, 2004*). These factors may appear influential while making a risky decision within the group or individually. For instance, it may happen that more extravert people tend to be very convincing during the group discussion (Zhang and Casari, 2012), whereas people who are very agreeable tend to let other people decide and easily agree with others’ choices independently on their own preferences (Barry and Friedman, 1998; Müller and Schwierien, 2012). We could also expect that more conscious people will reveal more risk-aversion compared to those who have lower level of conscientiousness (Zhang and Casari, 2012; Mayfield, Perdue, Wooten, 2008). Therefore, we found it useful to include the personality test to our questionnaire in order to control for each of those five characteristics in the empirical analysis.

3 HYPOTHESES

There exists abundant evidence that women are more risk averse than men (Croson and Gneezy, 2009, Charness and Gneezy, 2012) although the effects are sometimes small and task-specific (Filippin and Crosetto, 2016). For the task employed in the present paper, gender differences were consistently observed such that we expect to see them also in our data.

Hypothesis 1: IC is higher for men than for women

One can expect that women's higher degree of risk aversion will also be reflected in the group choice, i.e. risk taking of groups is increasing with the number of male members. Some initial, though partly conflicting, evidence in the context of investment games has been reported by Niboer (2015) and Bogan et al. (2013).

Hypothesis 2: GC is increasing in the number of male group members

Although we did not give any instructions to subjects how they should come to the group decision a reasonable benchmark in the decision process is given by the outcome under majority voting. From the political economy literature it is well-known that the median voter determines the outcome of majority voting (Black, 1948). Assuming that women are more risk averse than men, the median voter is more likely to be female in female dominated groups (FFF & FFM) and male in male dominated groups (FMM & MMM). From Hypothesis 1, we, therefore, get the next hypothesis.

Hypothesis 3: GC is higher in male than in female dominated groups.

The main focus of the present paper is to compare individual and group choices. The risk as value hypothesis would predict a general risky shift which has not been observed in studies based on similar designs as ours. We assume in line with the experimental results of Daly and Wilson (2001) that particularly men change their individual preferences towards higher risk taking in group contexts. This is consistent with the risk as value hypothesis where risk taking is a cultural value mainly for men. It implies that the tendency to risky shifts increases with the number of male group members. This gender-specific polarization hypothesis is formalized as follows.

Hypothesis 4: GC – IC is increasing with the number of male group members.

As in Hypothesis 3, we can again consider the benchmark of majority voting. Since higher degrees of male risk aversion lead to female (male) median voters in female (male) dominated groups our gender-specific polarization hypothesis has the following implication.

Hypothesis 5: GC – IC is higher in male than in female dominated groups.

4 RESULTS

4.1 Individual Choice

Table 2 analyzes the individual lottery choices. On the individual level we find support for Hypothesis 1 that women take less risk on average than men (significant at the 1% level). Risk taking also seems to increase with age in our sample. Personality characteristics play a role in the sense that more conscious participants take less risk on average.

Table 2: Ordered Probit regressions with individual choice as dependent variable

	Model 1	Model 2	Model 3 Women only	Model 4 Men only	Model 5 Group types
constant	1.628 (1.10)	1.261 (1.18)	0.884 (1.61)	1.677 (1.65)	1.540 (1.11)
Female	-0.611*** (0.15)	-0.604*** (0.15)			-0.523*** (0.20)
Age	0.068** (0.03)	0.064** (0.03)	0.075* (0.04)	0.042 (0.04)	0.063** (0.03)
singlesex		-0.227 (0.17)	-0.331 (0.23)	-0.142 (0.23)	
male=0 (FFF)					Reference group
male=1 (FFM)					0.290 (0.24)
male=2 (FMM)					0.308 (0.29)
male=3 (MMM)					0.151 (0.31)
Neuroticism (NStd)	-0.003 (0.01)	-0.004 (0.01)	-0.013 (0.01)	0.002 (0.01)	-0.004 (0.01)
Extraversion (Estd)	0.015 (0.01)	0.015 (0.01)	0.013 (0.01)	0.016 (0.01)	0.015 (0.01)
Openness (Ostd)	-0.002 (0.01)	-0.002 (0.01)	0.000 (0.01)	-0.002 (0.01)	-0.002 (0.01)
Agreeableness (VStd)	-0.001 (0.01)	-0.002 (0.01)	-0.012 (0.01)	0.006 (0.01)	-0.002 (0.01)
Consciousness (GStd)	-0.021*** (0.01)	-0.022*** (0.01)	-0.026** (0.01)	-0.020* (0.01)	-0.022*** (0.01)
No. of Obs.	240	240	127	113	240
Pseudo R2	0.045	0.048	0.042	0.018	0.049
Prob > chi2/F	0.000	0.000	0.015	0.422	0.000

Note: Standard errors are clustered at the group level and given in parenthesis,,
Significance level: * p<0.10, ** p<0.05, *** p<0.010

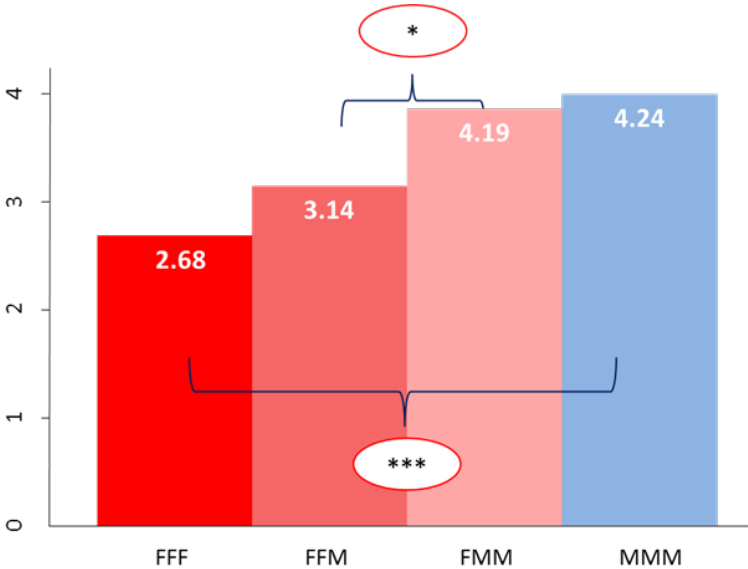
In order to see whether the group composition had an influence on the individual choice we added a dummy variable for single-sex groups, turning one when the group is composed of only men or only women (Models 2-4) and the group composition, namely the number of male participants (Model 5). Both coefficients (single-sex and number of males) are insignificant and we therefore conclude that there is no group composition effect on the individual choice. This is

consistent with the results of Harrison et al. (2010) and allows us to compare group and individual choices in the next subsection.

4.2 Group Choice

In a first step we simply compare the means of the group decisions between group types. Figure 2 clearly shows that, in line with Hypothesis 2, risk-taking of groups increases with the number of male group members. A Kruskal-Wallis test shows that the graphically observed trend is highly statistically significant (Chi-squared = 12.412, p=0.006) shows. These findings support previous results by Bogan et al. (2013) and particularly by Niboer (2015). To confirm the graphical analysis we conducted a pairwise comparison of the means with a two-sample Wilcoxon rank sum test which shows that there is a significant difference between purely male (MMM) and purely female groups (FFF) and also between male dominated (FMM) and female dominated (FFM) groups. The differences between purely female (male) and female (male) dominated groups is however not statistically significant. This pattern is fully in line with Hypothesis 3: If men are consistently more risk tolerant than women, the median voter theorem implies a strong difference between FFM and FMM but no differences between FFF and FFM or FMM and MMM.

Figure 2: Average group choice by group types



Note: Pair wise comparison of the group means with a two-sample Wilcoxon rank-sum test, Significance level: * p<0.10, ** p<0.05, *** p<0.010

To provide further insight into the group choice we conducted ordered probit regressions with the group choice as dependent variable and number of male group members as independent variable (Table 3, Model 1). The coefficient is highly significant and confirms that risk taking of the group increases linearly with the number of men in the group. This effect remains significant

when controlling for the mean of the group member's individual choices (Model 2). The positive coefficient for the mean individual choice shows, as expected, that the groups' risk taking increases with the average individual choice. The fact that the adjusted R2 increases substantially from Model 1 to Model 2 further shows that the mean individual choice explains a rather large proportion of variation in the group choice. All other control variables added (highest degree, age, happiness, number of siblings – Model 3) do not alter the results and turn out to be statistically insignificant.

Table 3: Ordered Probit regressions with group choice as dependent variable and number of male group members as independent variable plus controls.

	Model 1	Model 2	Model 3
Nb. of male group Members	0.370*** (0.10)	0.237** (0.11)	0.215* (0.11)
IC (group mean)		0.558*** (0.11)	0.616*** (0.12)
Degree (group mean)			-0.047 (0.27)
Age (group mean)			-0.077 (0.05)
Happiness (group mean)			-0.180 (0.18)
Siblings (group mean)			-0.147 (0.19)
Constant	1.374*** (0.23)	3.331*** (0.47)	0.719 (1.30)
No. of Obs.	85	85	85
Pseudo R2	0.043	0.130	0.147
Prob > chi2/F	0.000	0.000	0.000

Note: Regressions at the group level, Standard errors in parenthesis, Significance level: * p<0.10, ** p<0.05, *** p<0.010

4.3 Risky Shift and Polarization

Table 4 compares group and individual choice for all group compositions. The first row of the table shows that GC and IC are identical over all groups. This means that there is no general risky or cautious shift in our data. Rows 2-5 reveal that GC – IC tends to increase with the number of male group members, the only exception is the step from FFF and FFM. Rows 6 and 7 show that, in line with Hypothesis 5, GC – IC is substantially higher in male than in female dominated groups. A Wilcoxon test confirms that this pattern is significant at the 5%-level (z = -2.05, two-sided).

In the preceding subsection we showed that IC is not significantly influenced by the composition of groups subjects were assigned to. In order to reconfirm that the pattern we observe is not

caused by biased measurement of IR we report in the fourth column of Table 4 hypothetical values of IC. These were constructed as follows: We took average values of IC for men and women over all groups. These averages obviously cannot be biased by group membership. Hypothetical IC for each group can now be calculated by taking the weighted sum of the average of females (3.07) and males (4.06) according to the respective group composition. It turns out that the pattern we observed with IC is rather similar to those which would be obtained by Hypothetical IC. In all cases there is a cautious shift for female dominated groups and a risky shift for male dominated ones.

Table 4: Comparing Group and Individual Choice

Group type	GC	IC	GC – IC	Hypothetical IC	N
All	3.55 (1.78)	3.56 (1.74)	0	3.55	254
FFF	2.68 (1.52)	2.82 (1.58)	- 0.14	3.07	66
FFM	3.14 (1.77)	3.56 (1.64)	- 0.42	3.40	63
FMM	4.19 (1.91)	4.02 (1.85)	0.17	3.73	63
MMM	4.24 (1.45)	3.89 (1.67)	0.35	4.06	62
Female dominated (FFF & FFM)	2.91 (1.64)	3.18 (1.65)	- 0.27	3.23	129
Male dominated (FMM & MMM)	4.21 (1.68)	3.95 (1.76)	0.26	3.89	125

Note: Standard deviations in parenthesis

Hypotheses 4 and 5 are further supported by the regression analysis in Table 5 which investigates the determinants of the observed group shift (GC – IC). Model 2 shows that the number of male group members increases GC – IC significantly at the 1%-level. Consequently, a risky shift is more likely the higher the fraction of men in the group. Model 1 analyzes whether the group shift is influenced by the average individual choice. In case of polarization one would expect a cautious shift for groups with low average IC and a risky shift for groups with high average IC. Consequently, the coefficient for average IC should be significantly positive. Since this is not the case, we can conclude that there is no general pattern of polarization in our data. Model 3 shows that our main result is also robust if we control for average IC. Two other variables influence GC – IC significantly, female and consciousness. From Table 2 we know that females and more conscious subjects have lower values of IC which obviously leads to higher

values of GC – IC. As a robustness check Tobit regressions were run and lead to the same results (see Appendix).

Table 5: OLS regressions with group shift (GC – IC) as dependent variable

	Model 1	Model 2	Model 3
Average IC	-0.168 (0.153)		-0.263 (0.159)
Nb. of male group members		0.516*** (0.158)	0.618*** (0.189)
Female	-0.123 (0.324)	0.896*** (0.308)	0.894*** (0.309)
Age	-0.070 (0.059)	-0.081 (0.057)	-0.068 (0.058)
Degree	0.011 (0.165)	-0.055 (0.158)	-0.030 (0.158)
Siblings	-0.114 (0.086)	-0.119 (0.082)	-0.116 (0.082)
Happiness	-0.173 (0.137)	-0.132 (0.134)	-0.152 (0.131)
Consciousness	0.027** (0.011)	0.024** (0.011)	0.021* (0.012)
constant	1.865 (1.417)	0.362 (1.277)	1.014 (1.331)
No. of Obs.	240	240	240
Adj. R2	0.029	0.060	0.082
Prob>chi2/F	0.073	0.001	0.002

Note: Standard errors are clustered at the group level and given in parenthesis, Significance level: * p<0.10, ** p<0.05, *** p<0.010

5 DISCUSSION

Our study has shown that the gender composition of groups has a systematic impact on their choice behavior between risky options and the pattern of group polarization. The fact that women are more risk averse than men for our elicitation method is reflected also in group choices as a lower fraction of female group members leads to increased risk taking. Overall, we do not observe any pattern of group polarization as individuals and groups make on average equally risky choices. However, when we take account the group composition a clear pattern emerges: while male dominated groups shift to higher riskiness the opposite is true for female dominated ones. This pattern supports our gender-specific polarization hypothesis. As risk taking is a cultural norm particularly for men, we were expecting the group shift to be more risky for male dominated groups.

While our evidence is rather clear-cut it may, nevertheless, be sensitive with respect to the elicitation method. Filippin and Crosetto (2016) showed that gender differences in risk taking are particularly pronounced for elicitation methods which involve, as ours, a safe option. In the

absence of such an option gender differences are minor which should also reduce the effects of group composition. Also the direction of group shifts seems to depend on the elicitation method. While we do not observe a general shift in our data other studies which also employ monetary incentives did. Pairwise choice, elicitation of willingness-to-pay, and the Holt-Laury method generated a cautious shift in previous studies (Masclot et al., 2009; Baker et al. 2008; Shupp and Williams, 2008; Pahlke et al., 2012). In contrast, for the investment game of Gneezy and Potters (1997) risky shifts were observed (Sutter, 2009; Niboer, 2015). It is an open question for future research which impact gender composition will have under these alternative elicitation methods.

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7 APPENDIX

Table A1: Tobit regressions with group shift (GC – IC) as dependent variable

	Model 1	Model 2	Model 3
Average IC	-0.188 (0.168)		-0.290 (0.177)
Nb. of male group members		0.551*** (0.168)	0.664*** (0.206)
Female	-0.167 (0.350)	0.930*** (0.319)	0.927*** (0.319)
Age	-0.076 (0.065)	-0.088 (0.063)	-0.074 (0.064)
Degree	0.014 (0.182)	-0.057 (0.175)	-0.029 (0.174)
Siblings	-0.112 (0.089)	-0.118 (0.085)	-0.114 (0.085)
Happiness	-0.179 (0.143)	-0.135 (0.140)	-0.156 (0.136)
Consciousness	0.028** (0.012)	0.025** (0.011)	0.022* (0.012)
Constant	2.042 (1.570)	0.419 (1.399)	1.140 (1.458)
Sigma constant	1.923*** (0.159)	1.892*** (0.161)	1.866*** (0.141)
Model	Tobit	Tobit	Tobit
No. of Obs.	240	240	240
Pseudo R2	0.015	0.022	0.029
Prob>chi2/F	0.060	0.000	0.001

Note: Standard errors are clustered at the group level and are given in parenthesis,
Significance level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$

Table A2: Randomization females

Variable	Group type			T-Test (two-sided)		
	FFF	FFM	FMM	FFF vs. FFM	FFF vs. FMM	FMM vs. FFM
Individual choice	2.82 (SD 1.58)	3.36 (SD 1.67)	3.29 (SD 1.98)	0.09*	0.27	0.88
Age	23.36 (SD 3.2)	25.6 (SD 8.36)	24.57 (SD 2.64)	0.05*	0.12	0.59
Degree	1.44 (SD .98)	1.6 (SD 1.11)	1.91 (SD 1.09)	0.45	0.07*	0.3
Happiness	3.96 (SD 1.04)	3.48 (SD 1.25)	3.71 (SD 1.35)	0.03**	0.4	0.49
Happiness today	3.61 (SD 1.14)	3.38 (SD 1.32)	3.62 (SD 1.36)	0.35	0.97	0.51
No. Siblings	1.46 (SD 1.23)	1.74 (SD 1.53)	1.52 (SD 1.12)	0.29	0.82	0.57
Neuroticism (NStd)	48.26 (SD 9.12)	48.8 (SD 9.57)	50.29 (SD 8.71)	0.77	0.37	0.56
Extraversion (Estd)	49.02 (SD 9.26)	50.7 (SD 10.26)	49.95 (SD 7.02)	0.39	0.67	0.77
Openness (Ostd)	46.02 (SD 11.86)	48.45 (SD 11.31)	46.67 (SD 7.95)	0.3	0.82	0.52
Agreeableness (VStd)	52.36 (SD 9.71)	55.18 (SD 11.27)	54.67 (SD 8.21)	0.18	0.33	0.86
Consciousness (GStd)	51.5 (SD 8.72)	52.18 (SD 11.69)	55.67 (SD 9.13)	0.74	0.06*	0.24

Note: Significance level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$

Table A3: Randomization males

Variable	Group type			T-Test(two-sided)		
	MMM	FMM	FFM	MMM vs. FMM	MMM vs. FFM	FMM vs. FFM
Individual choice	3.89 (SD 1.67)	4.38 (SD 1.7)	3.95 (SD 1.57)	0.15	0.88	0.34
Age	23.19 (SD 3.58)	24.07 (SD 3.6)	23.91 (SD 3.38)	0.22	0.43	0.86
Degree	1.37 (SD 0.95)	1.45 (SD 0.97)	1.1 (SD 0.63)	0.67	0.22	0.13
Happiness	3.84 (SD 1.04)	3.83 (SD 1.17)	3.95 (SD 1.20)	0.98	0.68	0.71
Happiness today	3.69 (SD 0.99)	3.64 (SD 1.21)	3.62 (SD 0.97)	0.82	0.77	0.94
No. Siblings	1.42 (SD 1.18)	1.31 (SD 1.05)	1.43 (SD 1.29)	0.63	0.98	0.7
Neuroticism (NStd)	48.26 (SD 9.38)	47.33 (SD 10.89)	48.05 (SD 7.09)	0.65	0.93	0.79
Extraversion (Estd)	51.84 (SD 8.28)	51.83 (SD 9.75)	50.48 (SD 10.92)	0.998	0.55	0.62
Openness (Ostd)	48.87 (SD 8.35)	48.52 (SD 10.50)	48.67 (SD 11.35)	0.85	0.93	0.96
Agreeableness (VStd)	50.23 (SD 10.40)	51.36 (SD 10.34)	52.57 (SD 11.04)	0.59	0.38	0.67
Consciousness (GStd)	51.35 (SD 9.75)	52.16 (SD 10.99)	48.28 (SD 9.99)	0.71	0.25	0.21

Note: Significance level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$

PAPER 5: MINDFULNESS, PREFERENCES AND WELL-BEING: MINDFULNESS PREDICTS ADOLESCENTS' FIELD BEHAVIOR

Katharina Lima de Miranda

Abstract

Mindfulness could influence economic and health related behavior by bringing about increased and unbiased attention to the present moment, for example to a decision making process. This study explores the relationship between mindfulness and economic preferences, and consequently well-being, of adolescents. Comprehensive data of 525 German secondary school students were elicited and show no evidence for a strong linear or non-linear correlation between mindfulness and economic preferences. However, both mindfulness and preferences have explanatory power for adolescents' field behavior and thus contribute to explaining variation in behavior that may translate into serious health and economic consequences. In this regard, my findings indicate that the two concepts play rather complementary than substitutable roles, which implies that an integration of economic preferences and personality traits such as mindfulness may improve the analysis of potential sources of variation in life outcomes. As mindfulness reflects on a healthier lifestyle (less smoking and smaller BMI) and higher life satisfaction, the findings furthermore point into the direction that the development of mindfulness skills might help students to grow social-emotional capacities and increase physical and psychological well-being.

Key words: time preference, risk preferences, mindfulness, personality, experiments with adolescents, subjective well-being

JEL classifications: C93, D81, D90, I12, I20

1 INTRODUCTION

Many decisions which set the course of life, like investment in education, are taken at a young age. Furthermore, a crucial set of non-cognitive abilities is formed and developed during childhood and these abilities appear to be as important, if not more important than cognitive abilities in determining social, economic and physical well-being in adolescence and in adulthood (Bowles et al., 2001; Heckman et al., 2006). While the predictive power of cognitive ability is well documented, economists and psychologists continue to examine the influence of non-cognitive abilities on life outcomes (Almlund et al., 2011).

The analysis of economists in this regard typically focuses on economic preferences and empirical evidence has shown that these are indeed able to explain heterogeneity in behavior and life outcomes. In particular, experimentally elicited time and risk preferences of adults predict a wide range of important field behavior, as for example smoking, alcohol consumption or obesity (Chabris et al., 2008; Weller et al., 2008) as well as saving decisions and credit card borrowing (Eckel et al., 2005; Meier and Sprenger, 2010). Also for children and adolescents time preferences seem to serve as a good predictor for health and economic related behavior. Less patient behavior in adolescents has been found to be related to a higher propensity to spend money on alcohol and cigarettes, a higher body mass index, a lower propensity to save, lower grades, and more violations of the school's code of conduct (Castillo et al., 2011; Sutter et al., 2013). Moreover, the positive relationship between patience as a child or adolescent and school performance, health, labor supply and lifetime income seems to persist even after several decades (e.g. Golsteyn et al., 2014; Moffitt et al., 2011). This is also supported from a theoretical point of view as human capital theory postulates a reverse relationship between high discount rates and investment in education (Mincer, 1958; Becker, 1964). Sutter et al. (2013, p.510) even conclude that *"taken together, more impatient children and adolescents have a considerably worse health and economic outlook"*.

In contrast to economists, psychologists rather concentrate on personality traits in the analysis of the influence of non-cognitive abilities on life outcomes. Their findings indicate that measures of personality predict a wide range of life outcomes, which are also of interest for economists (Almlund et al., 2011). Hence recently, there has been a raising interest in integrating psychological personality concepts into theories of economic choice (see e.g. Borghans et al., 2008; Camerer, 2010; Almlund et al., 2011). Empirical evidence is starting to grow as well, but overall the analysis of the relation between economic preferences and personality and their predictive power for life outcomes is still limited (Becker et al., 2012).

To gain new insights in the relation between economic preferences and personality, this study explores whether economic preferences are related to mindfulness. Mindfulness is a

psychological concept which increasingly achieves attention and is defined as purposely paying attention in the present moment in a non-judgmental way (Kabat-Zinn, 1994). It has been shown to predict health related behavior both in terms of mental and physical health (see for example reviews by Black et al. (2009) and Burke (2010)). Mindfulness can be interpreted as a particular form of awareness which can be achieved through attention regulation, bringing about a kind of non-elaborative awareness to current experience and the capacity to relate to one's experience with curiosity, experiential openness, and acceptance (Bishop et al., 2004). One aspect of mindfulness is thus, taking an objective stand with regard to a current situation, for example a decision making process, and respond more skillfully to whatever is actually happening. Therefore, it seems likely that mindfulness influences decision making and might be related to economic preferences elicited in choice experiments.

Whether and how mindfulness relates to economic preferences is, to my knowledge, not documented in the economics literature so far. There is only one study that mentions mindfulness in relation to preferences and finds that mindfulness is one component of a factor which is negatively associated with the discount rate (Daly et al., 2009). Scarce evidence point into the direction that meditation, which is one part of mindfulness training, is related to efficient decision making. Experienced meditators have been found to accept unfair offers more often than non-meditators in an ultimatum game (Kirk et al., 2011) and subjects exposed to meditation shortly before an investment game exhibited more trust and pro-social behavior than controls (Di Bartolomeo and Papa, 2015). Other personality measures that are closely related to mindfulness and have been analyzed in relation to economic preferences are self-control, emotion regulation, and conscientiousness¹. Self-control, is described as the ability to utilize regulatory resources to consciously regulate emotion and behavior and, therefore, may describe an important ability to take inter-temporal decisions (Vohs et al., 2008). It has indeed been found to be positively correlated with patience (Daly et al., 2009). Emotion regulation is another personality trait related to being able to resist immediate rewards. It seems to influence the pattern of trading among financial investors (Seo and Barrett, 2007) and to diminish loss aversion in experimental settings (Sokol-Hessner et al., 2007). Conscientiousness is one component of the well-established *Big Five* personality taxonomy and involves the ability to make sacrifices now for future rewards. Mindfulness and conscientiousness are related as they share a focus on self-discipline and self-regulation as well as thoughtful and deliberate response (see Giluk (2009) for a meta-analysis of the relation between mindfulness and the Big-Five). Conscientiousness has been linked to economic preferences, but findings are mixed. There is some evidence for a significant positive correlation between conscientiousness and patience in

¹ Mindfulness has been found to be positively correlated with emotion and self-regulation, as well as conscientiousness (Brown et al., 2011).

survey data (Becker et al., 2012; Mahalingam et al., 2014). However, others find no significant relationship between this personality trait and preference measures for time and risk attitudes (Dohmen et al., 2010; Rustichini et al., 2012).

The relationship between mindfulness and decision making is of additional interest because mindfulness training and mindfulness based interventions gain more and more popularity. Although mindfulness is regarded a trait (e.g. Kabat-Zinn, 2003), there is concordance among researchers that it can be strengthened and cultivated by mindfulness training (Brown et al., 2011). Practices in mindfulness are originally based on Buddhist meditation practices, but are conducted mainly in secular ways. Interventions like the *Mindfulness Based Stress Reduction* program have been shown to increase mindfulness (Brown et al., 2011). Furthermore, numerous studies have shown that mindfulness training can lead to a reduction of symptoms of anxiety and depression and to promote self-regulated behavior and positive emotional states in adults (e.g. Baer, 2003). There is less evidence with children and adolescents, but research and clinical interest is growing and there are a certain number of studies suggesting benefits of mindfulness based interventions for this target group (for an overview see e.g. Burke, 2010 or Weare, 2013).

Therefore, this study will explore whether mindfulness relates to economic preferences and thereby influences field behavior or whether mindfulness acts directly on field behavior. The analysis will proceed in three steps. First, it is tested whether and how mindfulness relates to time and risk preferences. In a next step, it is analyzed whether there is a relationship between mindfulness and field behavior and finally it is assessed whether mindfulness and economic preferences substitute or complement each other in predicting field behavior. The analysis is done with the help of a cross-sectional experimental study with German secondary school students. Time and risk preferences of 525 adolescents in the tenth grade (mean age=16) were elicited in a fully incentivized experiment. Mindfulness was measured through self-reports by the Mindful Attention Awareness Scale - Adolescents (MAAS-A). Students' field behavior includes health related behavior (smoking, drinking alcohol and BMI), economic related behavior (saving and education), and subjective well-being. In contrast to other studies that assess time preferences of children and adolescents (Castillo et al. 2011; Sutter et al., 2013), this study thoroughly controls for the socio-economic background with a well-established measure (family affluence scale by Currie et al., 1997). This is important because the socio-economic background has been shown to influence time and risk preferences of adolescents (Deckers et al., 2015). In a nutshell, this student sample contains experimental indicators for preferences, a well-adapted measure for trait mindfulness, several indicators of field behavior and detailed demographic information. It therefore allows to assess potential relations between economic preferences and mindfulness and their predictive power for adolescents' field behavior.

Relating mindfulness to economic preferences I find no evidence for a strong linear or non-linear correlation. However, both mindfulness and preferences have explanatory power for adolescents' field behavior and thus contribute to predict behavior that may translate into serious health and economic consequences. In this regard, my findings indicate that the two concepts play rather complementary than substitutable roles. This implies that an integration of economic preferences and personality traits, such as mindfulness, may improve the analysis of potential sources of variation in life outcomes. As mindfulness reflects on a healthier lifestyle (less smoking and smaller BMI) and higher life satisfaction, the findings furthermore point into the direction that the development of mindfulness skills might help students to grow social-emotional capacities and increase physical and psychological well-being.

The rest of the paper is organized as follows. In Section 2 the sample of adolescents, the experimental design and the methods used to elicit mindfulness and economic preferences are described. Section 3 analyzes the link between mindfulness and economic preferences. Section 4 assesses how mindfulness relates to field behavior. In Section 5 the explanatory power of field behavior by mindfulness and economic preferences is evaluated jointly. Section 6 discusses the main findings and concludes the paper.

2 EXPERIMENTAL DESIGN AND METHODS

2.1 Participants and general experimental set-up

Classroom experiments with 525 tenth grade students on average 16 years old were conducted from February to May 2015 (Age: $M=15.94$, $SD=0.64$, Gender: 261 girls (49.7%))². 27 classes from eight secondary schools in the state of Schleswig-Holstein, Germany, agreed to participate. The German secondary education system includes different types of schools varying in the level and length of schooling. Three different types of secondary schools participated (Gymnasium (3), Gemeinschaftsschule (3), Regionalschule (2)), which led to a broad set of students with different socio-economic and intellectual backgrounds. The experiments were conducted during school hours which minimized dropouts and self selection. Although participation was not mandatory and parents were asked for their permission, in seven out of eight schools all students of each class present at that day participated in the experiment. The study was approved by the Ministry for School and Professional Education of Schleswig-Holstein.

The experiment was computer based and lasted one school hour (45 minutes). It was administered anonymously in the classroom or the school's computer lab using the mobile Kiel Econ Lab and running Z-tree (Fischbacher, 2007) with a maximum of 25 participants. The

² This experiment was part of a larger cross-sectional experimental study which analyzed various preferences and several aspects behavior.

decisions were incentivized and each student was paid according to his or her choices. Payments ranged between €1 and €10 and the average payment was €4.32. Students completed several economic experiments (incentivized decision tasks) and had to fill out a questionnaire. All students faced the same instructions, decision tasks, questionnaire and payments. While inside a class all students faced the same sequence of decision tasks, it was randomized on the class level in order to account for order effects. We took particular care to explain to the students that they could earn money in the experiments and that their payments would depend on their choices. Payments were determined at the end of the experiments. To do so one choice set out of one experiment was randomly selected and became relevant for payment. Students were then paid according to the choice they had made. They were directly paid in cash, except for future payoffs in the time preference task, for which a sealed envelope was handed to the teacher who was instructed to hand it to the according student on the determined date in the future³.

2.2 Methods

2.2.1 Measuring mindfulness: Mindful Attention Awareness Scale - Adolescents (MAAS-A)

In order to measure mindfulness the Mindful Attention Awareness Scale - Adolescents (MAAS-A) was used. The MAAS-A evolved from the MAAS, its adult counterpart, which is one of the most commonly used mindfulness questionnaires (Bruin et al., 2011). The MAAS permits a concise assessment of mindfulness in healthy and clinical samples. It was first developed and validated for adults (MAAS) by Brown and Ryan (2003) and was then validated for adolescents (MAAS-A) in several samples and countries (Brown et al. (2011) in the USA, Black et al. (2012a) in China, Bruin et al. (2011) in the Netherlands). These studies showed that the MAAS-A is related to a variety of emotion regulation, behavior regulation, mental health, and well-being phenomena.

The MAAS-A is a 14-item self-assessment scale, which measures trait mindfulness. Items include for example “I find it difficult to stay focused on what’s happening in the present,” “I could be experiencing some emotion and not be conscious of it until sometime later,” and response options range from 1 (almost never) to 5 (almost always). It attempts to capture the open and undivided observation of inner and external stimuli, thus conceptualizes mindfulness as a one-dimensional degree of inattention regarding external or internal stimuli (Brown et al., 2011). To control for social desirability, students were made aware that there was no right or wrong and that their own opinion was of interest. Here the German adaptation by Michalak et al. (2008) was used. For the analysis mean scores were reversed such that higher scores indicate higher trait mindfulness.

³ One school refused payments in cash. At this school coupons for the schools canteen were used, which, in my view, is most likely perceived as equivalent to cash because students could spend their coupons on whatever they liked in the canteen, for example lunch or sweets.

2.2.2 Measuring impatience: Time preference task

In order to measure impatience two decision sets with 20 binary choices each were presented to the students. In Set 1 they were asked to choose between a fixed payment today and a fixed payment three weeks later. The early payment remained fixed at €4.00 and the delayed payment increased monotonically in €0.10 steps from €4.00 to €5.90. Since the delayed payment increases with each step it becomes more attractive and students should switch from the immediate payment to the delayed payment at some point according to their time preferences. For each student the future equivalent - average between the amount of the last tick on the left hand side (immediate payment) and the amount of the first tick on the right hand side (delayed payment) - is taken as the measure for impatience. Consider for example a student that chose to receive €4.00 today instead of receiving €4.20 in 3 weeks in row 3 and then switches to the right hand side by choosing €4.30 in 3 weeks instead of €4.00 today in row 4 (see Figure 2). The future equivalent thus equals €4.25 in our example. Students are considered to be more impatient the higher the future equivalent is, in other words the later they switch from the left to the right hand side of the choice list. Set 2 is nearly identical to Set 1 except that there was an upfront delay of three weeks. Students had to choose between a fixed payment in three weeks and an increasing payment in 6 weeks.

Figure 2: Example of a Set 1 choice list with future equivalent equal to €4.25

1) €4.00 today	<input checked="" type="checkbox"/> or	€4.00 in 3 weeks	<input type="checkbox"/>
2) €4.00 today	<input checked="" type="checkbox"/> or	€4.10 in 3 weeks	<input type="checkbox"/>
3) €4.00 today	<input checked="" type="checkbox"/> or	€4.20 in 3 weeks	<input type="checkbox"/>
4) €4.00 today	<input type="checkbox"/> or	€4.30 in 3 weeks	<input checked="" type="checkbox"/>
5) €4.00 today	<input type="checkbox"/> or	€4.40 in 3 weeks	<input checked="" type="checkbox"/>

This procedure is well adapted in the literature and has shown good results with children and adolescents (Bettinger and Slonim, 2007; Sutter et al., 2013). Euro amounts were similar to the ones used by Sutter et al. (2013), who study children at approximately the same age and culture area (their study was conducted in Austria with children and adolescents aged 10 to 18 years and showed robust results). The binary choices, the exact €4.00 front-end payment, and the monotonically increasing amount of compensation in the 3 weeks delayed period were meant to help to reduce the cognitive difficulty of the task. The choice lists were designed in a way that it was possible to switch only once from the left to the right hand side in each list.

A comparison of future equivalents between the two choice sets allows to test for exponential versus hyperbolic discounting (e.g. Laibson, 1997; Prelec, 2004). Exponential discounting would imply that the switching point is the same for both choice sets as the period between the two

payments remains constant (3 weeks). On the contrary, a higher switching point in Set 1 than in Set 2 indicates that the immediate payment receives more weight than the early payment in three weeks time. This would imply a present moment bias, accounted for in hyperbolic or quasi-hyperbolic discounting.

2.2.3 Measuring risk preferences: Lottery task

Risk preferences were elicited using an Eckel and Grossman (2002) type lottery as depicted in Table 2. This method is relatively easy to understand and has been shown to be significantly correlated with the results of other more complex risk elicitation methods while producing less noisy estimates (see Charness et al. (2013) for an overview). It is therefore practical for the use with adolescents. Students had to choose one out of six lotteries each with a 50% chance of winning and losing. The first lottery is a sure thing with a certain payoff of €4. For lotteries 1 to 5 the expected value and the risk, as represented by the variance, increase linearly. Lottery 6 has the same expected value as lottery 5 with a higher variance. Under expected utility risk-averse students would choose lotteries with a lower standard deviation (1–4), risk-neutral students the lotteries with the highest expected value (5 or 6). See Table 2 for an overview of the lottery task.

Table 2: Lottery task - Eckel and Grossman method

Lotteries (50/50 Chance)	Low payoff	High payoff	Expected value	Variance
Lottery 1	€ 4.00	€ 4.00	€ 4.00	0.00
Lottery 2	€ 3.50	€ 5.00	€ 4.25	1.06
Lottery 3	€ 3.00	€ 6.00	€ 4.50	2.12
Lottery 4	€ 2.50	€ 7.00	€ 4.75	3.18
Lottery 5	€ 2.00	€ 8.00	€ 5.00	4.24
Lottery 6	€ 1.00	€ 9.00	€ 5.00	5.66

2.2.4 Measuring field behavior

Data on several aspects of students' field behavior were collected through self-reports. As indicators for health related behavior information on smoking, drinking alcohol and the body mass index (BMI) were gathered. The variables smoking and drinking are binary variables, which take the value 1 in case a subject reported to smoke (drink alcohol) at least sometimes. The BMI is defined as weight divided by height squared, therefore resembles a continuous variable in the analysis. BMI is commonly categorized into normal weight (BMI between 18 and 25), underweight (BMI below 18) and overweight (BMI above 25). In terms of psychological well-being subjective life satisfaction was elicited via the German Students' Life Satisfaction Scale (Weber et al., 2013). It is the German adaptation of the Students' Life Satisfaction Scale (SLSS) first developed by Huebner (1991) and consists out of seven questions about ones overall satisfaction with life and in reference to others. As indicators for economic related behavior

measures for saving and educational attainment were elicited. Students reported the amount of monthly pocket money and its use. One of the categories for the use of pocket money was saving which was then used to construct a measure for saving. It is coded as 1 if subjects indicated in the questionnaire to save a substantive part of their monthly pocket money. As a measure of educational attainment the students' type of secondary school was used. The variable education is measured as an ordered variable ranging from 1 (regional school) over 2 (community school) to 3 (high school)⁴. In addition to the field behavior several other characteristics and demographic information were gathered. Students performed a short cognitive reflection test using raven matrices (Raven, 2000) and the results are used as an indicator of the students' cognitive abilities. Students also reported their grades in math, German, biology and physics. As an indicator of the socio-economic status the family affluence scale (FAS) by Currie et al. (1997) is used. Higher levels indicate a higher socio-economic background.

3 THE RELATION BETWEEN MINDFULNESS AND ECONOMIC PREFERENCES

3.1 Descriptive statistics

To give an overview of the measures for mindfulness, time and risk preferences Table 3 displays descriptive statistics as well as pair-wise correlations of the variables. The average MAAS-A score among participants is 3.35 (SD: 0.52) with a minimum of 1.64 and a maximum of 4.71. The histogram in Figure 3 shows the distribution of MAAS-A scores across the sample. A closer assessment of the mindfulness measure shows that mindfulness is not related to cognitive reflection, number of siblings or socio-economic background (see Appendix Table 10). Boys score slightly higher ($M=3.41$, $SD=0.31$) than girls ($M=3.30$, $SD=0.33$) and this difference is significant (paired t-test: $p=0.02$). However, the effect size (Cohen, 1988) of this gender difference is rather small ($d = 0.34$).

⁴ This exploits the fact that the German education system includes different types of secondary schools varying in the level and length of schooling. The education act of Schleswig-Holstein (Schleswig-Holsteinisches Schulgesetz) intends since 2014 a two-tier secondary education system with community schools (Gemeinschaftsschule) and high schools (Gymnasium), which start after 4 years of elementary school. In a community school all educational qualifications of secondary education can be acquired in a common educational background, this includes "Erster allgemeinbildender Schulabschluss" after the 9th grade, the "Mittlere Reife" after the 10th grade, which both qualify for vocational training, and in addition the "Abitur" after the 13th grade, qualifying for university admission. High schools prepare students for higher education and in the majority of high schools students can achieve their "Abitur" after the 12th grade. Besides community schools and high schools, there are still regional schools in place which terminate after the 10th school year. This school type will be discontinued in 2019/20, however in the school year 2015/16 approximately 12,900 students were enrolled (information from this paragraph is based on the state's website (Landesportal Schleswig-Holstein; 2016)).

Table 3: Descriptive statistics and correlations of mindfulness and economic preferences

Variable	Descriptive statistics				Pair-wise correlations		
	M	SD	n	Range	Mindfulness	Risk	Future equ.
Mindfulness	3.35	0.52	525	1-5	1.00		
Risk	2.60	1.69	525	1-6	-0.02 (0.60)	1.00	
Future equivalent	€ 4.90	0.62	525	€ 4-5.90	-0.02 (0.71)	-0.07 (0.11)	1.00

Significance levels are displayed below each correlation coefficient. Mindfulness = Mindful Attention Awareness Scale - Adolescents (MAAS-A), Future equivalent = measure for impatience (switching point from €4 today to a higher amount in 3 weeks), Risk = measure for risk attitudes (risk increases gradually from lottery 1 to 6).

The average future equivalent in this sample is €4.90 (SD=0.62), this means that an average student would want to receive at least €4.90 in three weeks to abstain from an immediate payment of €4.00. Figure 4 displays the distribution of the future equivalents across the sample in a histogram. The difference between the average future equivalent without (M=4.90 SD=0.62) and with upfront delay (M=4.93, SD=0.62) is small and no general evidence for hyperbolic discounting is found. The average future equivalent of girls is 4.95 (SD 0.040) and thus slightly higher than that of boys 4.86 (SD 0.037). But a Wilcoxon ranksum test shows no significant difference between the future equivalent of boys and girls ($z=1.276$, $p>|z|=0.202$).

Figure 3: Histogram of MAAS-A scores

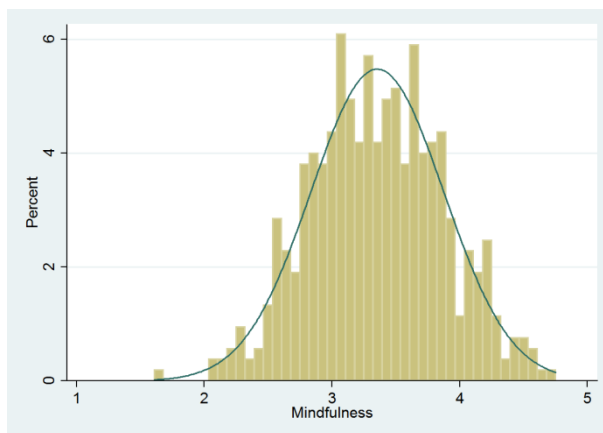
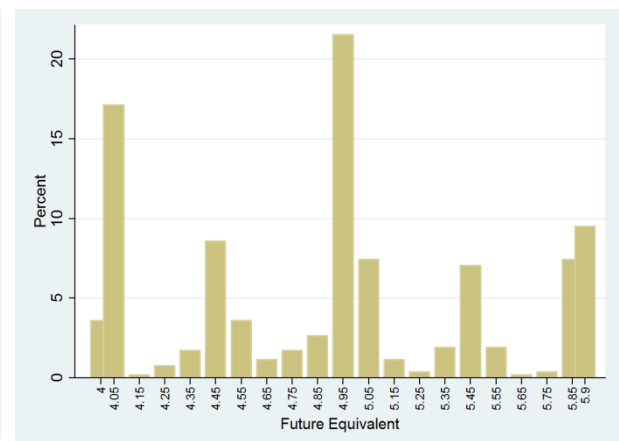


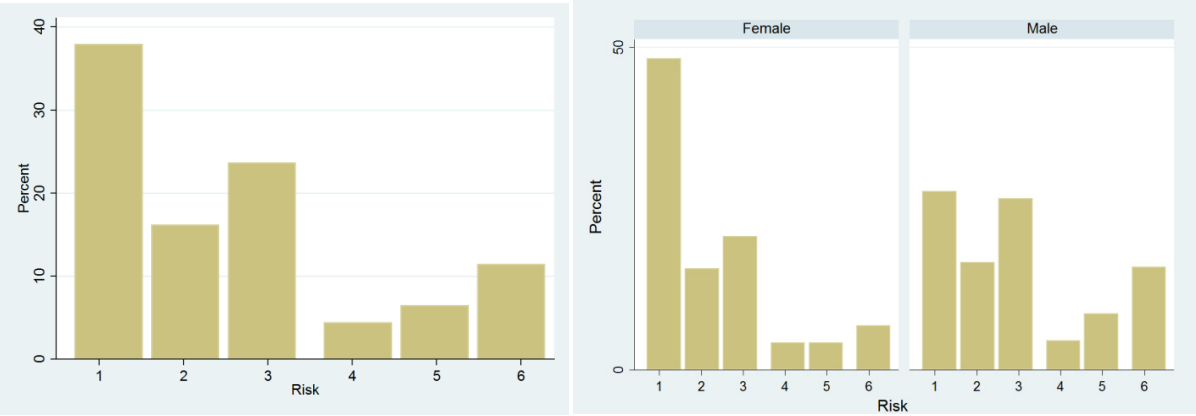
Figure 4: Histogram of the future equivalent



In terms of risk preferences the average subject decides for lottery 3 (M=2.60, SD=1.69). There is a substantive difference between the average risk taking of boys (M=3.00, SD=0.11) and girls (M=2.21, SD=0.09). A Wilcoxon ranksum test confirms that the difference is significant at the 1% level ($z= -5.343$, $p=0.00$). The histograms in Figure 5 show that 38% of the students decide for

the save option (lottery 1) and about one quarter (24%) chooses lottery 3. Considering girls only one observes that about half (48%) choose lottery 1 (sure payoff of €4.00). Looking at boys only one can see that lotteries 1 and 3 are chosen by about one quarter each (28% and 27%).

Figure 5: Histograms of risk preferences over all subjects and by gender



In summary, the collected data confirm the typical patterns observed in other studies. On average, students are risk averse and impatient (e.g. Sutter et al., 2013; Castillo et al., 2011; Bettinger & Slonim, 2007). The distribution and size of the future equivalents are similar to the ones found in other studies with adolescents (in particular to the study by Sutter et al. (2013) who use the same method and Euro amounts with adolescents in Austria). There is no evidence for hyperbolic discounting in this sample, which is in line with the findings from Sutter et al. (2013) but stands in contrast to those of Bettinger and Slonim (2007). Regarding gender differences, boys are slightly more mindful than girls, a pattern which has also been found in another adolescents’ samples (Brown et al., 2011). There is no significant gender difference in the future equivalents. The findings of other studies in this regard are contradictory, while Deckers et al. (2015) find that boys are more patient than girls, Bettinger and Slonim (2007) and Castillo et al. (2011) find that girls are more patient. Confirming previous evidence there is a significant gender difference in risk taking with boys taking more risk on average than girls (e.g. Cárdenas et al., 2012; or Deckers et al., 2015).

3.2 Regression analysis

Table 3 displays pair-wise correlation coefficients between mindfulness and time as well as risk preferences with significance levels in parenthesis. It shows that time preferences as well as risk attitudes are not significantly linearly correlated with mindfulness. In a next step a regression analysis is performed to extend the preliminary insights from the correlation table. Time and respectively risk preferences are taken as the dependent variable and are regressed on mindfulness. Demographic background variables are included as controls.

3.2.1 Time preferences and mindfulness

Table 4 depicts the regression analysis for time preferences, where the future equivalent without upfront delay becomes the dependent variable⁵. It confirms that there is no direct relationship between the average future equivalent and mindfulness (Model 1). To account for the fact that the future equivalent is censored from above and below a Tobit regression was run (Model 2). Furthermore, an interaction term between mindfulness and gender was introduced to see whether there is different variation for boys and girls (Model 3). All model specifications show a very small and insignificant coefficient for mindfulness indicating that there is no strong linear correlation between time preferences and mindfulness. Finally, mindfulness squared was added to the regression to check for a non-linear relationship (Model 4). The coefficient for mindfulness remains positive and increases (from 0.02 in Model 2 to 0.2 in Model 4) and the coefficient for mindfulness squared is negative. Therefore, there is a trend of a u-shaped relation between mindfulness and time preferences, which would mean that average mindful adolescents are the most impatient ones. However, both coefficients are insignificant and a zero coefficient cannot be ruled out.

Looking at the demographic control variables, the regressions confirm that there is no significant gender effect. Also, the coefficient for risk is insignificant (which is in line with the results of Bettinger and Slonim, 2007)⁶. Adolescents which are the first born of siblings are significantly more patient confirming the findings by Lampi and Nordblom (2011). Interestingly, students who receive more monthly pocket money are significantly more impatient on average. This seems counterintuitive as these students would depend less on the money from the experiment. However, this result comes in line with the finding of Sutter et al. (2013), who hypothesize that those students receiving more pocket money are less accustomed to abstain from spending money immediately and are therefore less willing to wait. The socio-economic background shows a significant negative coefficient, which indicates that students coming from a lower socio-economic background are more impatient (confirming the results of Deckers et al., 2015).

⁵ I only consider the future equivalent without upfront delay here for two reasons. First, it was always elicited before the future equivalent with upfront delay and therefore, I can rule out learning or ordering effects. Second, there is no significant difference between the future equivalent with and without upfront delay, as shown above. Finally, taking the future equivalent with upfront delay as the dependent variable does not change the signs or significance of the coefficients (see Appendix Table 11)

⁶ It has been argued that the time preference task implicitly involves risk (Andersen et al., 2008) and therefore one should control for risk in the regression to avoid a bias. While Bettinger and Slonim (2007) don't find a significant effect between time and risk preferences for adolescents, Sutter et al. (2013) and Castillo et al. (2011) find significant effects with more risk averse subjects being more impatient.

Table 4: Regression analysis of the future equivalent (impatience)

	Model 1	Model 2	Model 3	Model 4
	OLS	Tobit	Interaction	Non-linear
Mindfulness	0.003 (0.060)	0.021 (0.069)	0.046 (0.098)	0.203 (0.662)
Mind. x Male			-0.055 (0.117)	
Mindfulness ²				-0.027 (0.102)
Male	-0.075 (0.050)	-0.077 (0.058)	-0.077 (0.058)	-0.079 (0.061)
Risk	-0.018 (0.024)	-0.022 (0.027)	-0.022 (0.027)	-0.022 (0.027)
First born	-0.126** (0.059)	-0.154** (0.069)	-0.155** (0.069)	-0.153** (0.068)
Pocket Money	0.002** (0.001)	0.003** (0.001)	0.003** (0.001)	0.003** (0.001)
Raven	-0.002 (0.031)	0.010 (0.038)	0.010 (0.038)	0.010 (0.038)
FAS	-0.047*** (0.013)	-0.050*** (0.016)	-0.050*** (0.016)	-0.050*** (0.016)
constant	5.485*** (0.351)	5.402*** (0.434)	5.317*** (0.522)	5.102*** (1.089)
Model	OLS	Tobit	Tobit	Tobit
No. of Obs.	524	524	524	524
Adj./Psd. R ²	0.048	0.027	0.027	0.027
Prob>chi2/F	0.001	0.000	0.000	0.000

Robust standard errors clustered at the classroom level in parentheses, P-values: * p<0.10, ** p<0.05, *** p<0.010.

3.2.2 Risk preferences and mindfulness

Considering the relationship between risk preferences and mindfulness, there is a trend that mindfulness is related to less risk taking (see Table 5). The negative coefficient for mindfulness is found in all specifications (OLS, ordered Logit, interaction, non-linear) but is never significant and, therefore, I cannot reject the null hypothesis. When mindfulness squared is added to the regression (Model 4), the coefficient for mindfulness remains negative and increases in magnitude (from -0.2 in Model 2 to -1.3 in Model 4), the coefficient for mindfulness squared is positive. This, indicates an inverse u-shaped relation between mindfulness and risk preferences, which would mean that average mindful adolescents are more risk averse. However, both coefficients are insignificant and a zero coefficient cannot be ruled out.

In terms of control variables, the regression analysis again confirms the significant gender effect, with boys taking more risk on average than girls. Furthermore, the positive coefficient for FAS indicates that a higher socio-economic background is associated with higher risk taking (which

is in line with the findings by Deckers et al. (2015) or Dohmen et al., 2011). All other coefficients are insignificant.

Table 5: Regression analysis of risk preferences

	Model 1 OLS	Model 2 Ord. Logit	Model 3 Interaction	Model 4 Non-linear
Mindfulness	-0.145 (0.161)	-0.175 (0.161)	-0.123 (0.206)	-1.313 (1.540)
Mind. x Male			-0.108 (0.382)	
Mindfulness ²				0.170 (0.225)
Male	0.761*** (0.171)	0.876*** (0.179)	0.876*** (0.179)	0.886*** (0.185)
First born	-0.078 (0.211)	-0.091 (0.228)	-0.092 (0.226)	-0.097 (0.231)
Pocket Money	0.004* (0.002)	0.004 (0.002)	0.004 (0.002)	0.004 (0.002)
Raven	0.074 (0.070)	0.103 (0.080)	0.103 (0.080)	0.104 (0.080)
FAS	0.082** (0.030)	0.098*** (0.033)	0.099*** (0.034)	0.097*** (0.034)
Model	OLS	Ord. Logit	Ord. Logit	Ord. Logit
No. of Obs.	524	524	524	524
Adj./Psd. R2	0.067	0.027	0.027	0.027
Prob>chi2/F	0.000	0.000	0.000	0.000

Robust standard errors clustered at the classroom level in parentheses,
Significance levels: * p<0.10, ** p<0.05, *** p<0.010.

3.3 Discussion

The analysis of the relation between mindfulness and economic preferences showed that there is no indication for a strong linear or non-linear correlation between these measures. This finding might not come as a surprise as other researchers that relate personality traits and economic preferences find contradicting results. While some find a significant association for example between conscientiousness and time preferences (Becker et al., 2012; Mahalingam et al., 2014), others find no relationship between this personality trait and time or risk preferences (Dohmen et al., 2010; Rustichini et al., 2012).

One argument for not finding a correlation between mindfulness and time preferences is that there might be two opposing mechanisms at hand. On the one hand, one might expect that mindfulness will lead to more patient decisions, as mindfulness has been found to be positively associated with self-regulation (Brown et al., 2011; Bruin et al., 2011) and self-control (Black et al., 2012a). On the other hand, mindfulness puts the emphasis on the presence (e.g. Kabat-Zinn,

1990), which could in turn imply that more mindful people would discount the future more heavily than less mindful people.

Another argument for insignificant or very low associations between personality traits and economic preferences is that these measures are constructed in different ways (Becker et al., 2012). In my case mindfulness, as measured by the MAAS-A, tries to capture whether an adolescent is mindful in day-to-day life, which means to be frequently in a receptive state of attention in which one simply observes what is happening. The MAAS-A is rooted both in Buddhist practices and in clinical research on mindfulness and is measured by self-reports (Brown et al., 2011). Preferences on the other hand are based on utility maximization and are measured in standard incentivized experiments. Time preferences, for example, capture an adolescent's willingness to abstain from money today in order to receive a larger amount in the future and, therefore, the underlying concept is narrow. Hence, it might be possible that economic preferences are one particular aspect of mindfulness. However, the fact that no correlation is found between mindfulness and economic preferences, points rather into the direction that mindfulness and economic preferences actually measure distinct non-cognitive abilities and are complementary to each other.

4 HEALTH AND ECONOMIC CONSEQUENCES OF MINDFULNESS

As argued by Bowles et al. (2001) and Heckman et al. (2006), non-cognitive abilities, such as preferences or personality, influence educational and labor market outcomes. In the previous section the relation between mindfulness and economic preferences were analyzed and it is found that these measures are not correlated and are therefore not substitutable. This section will explore whether mindfulness has explanatory power for adolescents' field behavior. If it does, mindfulness might contribute to explaining heterogeneity in field behavior and, consequently, well-being of adolescents. The analysis here focuses on health related behavior (smoking, drinking alcohol and BMI), economical behavior (saving and education) and subjective well-being, which are all behaviors that may translate into severe health and economic consequences.

4.1 Descriptive results

Table 6 displays descriptive statistics of the variables of interest. 26% of the students reported smoking cigarettes at least sometimes and 81% reported drinking alcohol at least sometimes. The average BMI lies with 21.42 (SD 2.92) in the normal weight category⁷ and represents a

⁷ Five observations were omitted due to implausibly low values of the BMI, probably because subjects did not want to report their true weight.

typical value for adolescents of that age in Germany⁸. About one half of the students (48%) reported to use a major part of their monthly pocket money to save. On average, students reported to be quite satisfied with their life with a mean value of 3.69 (SD .77) on a scale from 1 (low satisfaction) to 5 (high satisfaction)).

Table 6: Descriptive statistics of field behavior and pair-wise correlations with mindfulness and time and risk preferences

Variable	Descriptive statistics			Pair-wise correlations		
	Mean	n	Values	Mindful	Impatience	Risk
Smoking	26%	525	0/1	-0.15 (0.00)	0.05 (0.22)	0.05 (0.23)
Drinking	81%	525	0/1	0.00 (0.98)	0.16 (0.00)	0.02 (0.64)
BMI	21.42 (SD=2.92)	520	14-34	-0.10 (0.02)	0.04 (0.39)	0.05 (0.27)
Saving	48%	478	0/1	0.04 (0.40)	-0.07 (0.13)	0.05 (0.23)
Education	14% regional school, 46% community school, 30% high school		0 1 2	-0.4 (0.42)	0.20 (0.00)	-0.20 (0.00)
Satisfaction	3.69 (SD=0.77)	525	1-5	0.32 (0.00)	0.03 (0.45)	0.06 (0.19)

Significance levels below each correlation coefficient, Smoking = Dummy variable indicating whether a student reported to smoke at least sometimes (=1), Drinking = Dummy variable indicating whether a student reported to drink alcohol at least sometimes (=1), BMI = weight divided by height squared, Saving = Dummy variable indicating whether a student reported to save (a major) part of his or her monthly pocket money (=1), Education = indicator of the school type (regional school=0, community school=1, high school=2), Satisfaction = Life satisfaction measured via the German Students' Life Satisfaction Scale.

The right hand side of Table 6 displays pair-wise correlations between field behavior and mindfulness as well as economic preferences (which will be discussed in the next section). It shows that there is considerable correlation between mindfulness and field behavior. Mindfulness is significantly negatively correlated with smoking indicating that more mindful students are less likely to smoke. The significant negative correlation coefficient between mindfulness and BMI points into the direction that more mindful students are less likely to become obese. Furthermore, the positive correlation between mindfulness and satisfaction indicates that more mindful students are on average more satisfied with their life. In terms of magnitude one can observe that all correlations coefficients are rather low according to Cohen (1988) and range between 0 and 0.32. As the correlation coefficients reported here only indicate

⁸ A representative examination survey of 17,641 children and adolescents aged 0–17 years living in Germany (KiGGS 2003–2006 study) found that the median BMI for boys at the age of 16 is 21.10, and 21.37 for girls respectively (Rosario et al., 2010).

a linear relationship between the two variables and do not account for non-linear relationships or control variables a regression analysis will be performed next.

4.2 Regression analysis

Table 7 summarizes the regression results where each column represents the individual regression of the field behavior regressed on mindfulness and some control variables (gender, monthly pocket money, math and German score, both relative to the class, and socio-economic background). In order to compare effect sizes more easily all continuous independent variables were standardized.

Overall, the results reported in Table 7 show that mindfulness seems to be a good predictor for adolescents' field behavior. Five out of six behaviors are highly significantly correlated to mindfulness. Concerning health related behavior (columns 1-3 in Table 7), the analysis shows a statistically significant negative relationship between mindfulness and smoking. This indicates that on average, the more mindful a student is the less likely he or she is to smoke. No such effect is found for drinking alcohol. For the BMI again a significant negative coefficient is found, which indicates that more mindful students are thinner on average. Therefore, the regression analysis confirms the correlation patterns found before even after controlling for demographic variable.

Table 7: Regression analysis of field behavior and mindfulness

	Smoking	Drinking	BMI	Saving	Education	Satisfaction
Mindfulness	-0.203*** (0.058)	-0.000 (0.076)	-0.300** (0.128)	-1.536*** (0.551)	1.134** (0.484)	1.629*** (0.198)
Mindfulness ²				0.450*** (0.152)	-0.338** (0.146)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	Probit	Probit	OLS	Probit	Ord. Probit	OLS
No. of Obs.	523	523	518	478	523	523
Adj./Psd. R2	0.078	0.040	0.088	0.043	0.057	0.161
Prob>chi2/F	0.000	0.000	0.001	0.000	0.000	0.000

Robust standard errors clustered at the classroom level are displayed in parentheses. For Probit models average marginal effects are displayed. Mindfulness is standardized to make effect sizes comparable. Control variables include gender, monthly pocket money, math and German score, both relative to the class, and socio-economic background. Stars represent the following p-values: * p<0.10, ** p<0.05, *** p<0.010.

In contrast to the health related behavior, the economic behavior did not show any linear correlation with mindfulness. However, having a closer look into the sample, reveals that these variables are related to mindfulness in a non-linear way (Table 7, column 4 and 5). Concerning the saving behavior, the significant coefficients for mindfulness (negative sign) and mindfulness squared (positive sign), indicate a u-shaped relationship between saving and mindfulness. This implies that average mindful students have the lowest probability to save. Dividing the sample at the median shows that for above average mindful students the saving probability increases

linearly with mindfulness, while for below average mindful students the relation is reversed and insignificant. A detailed regression table for saving can be found in the Appendix Table 15

Regarding education there is again a significant quadratic relationship, but this time it is inversely u-shaped. This indicates that average mindful students have a higher probability to study at higher level schools. Again, dividing the sample at the median gives a clearer picture and shows that for below average mindful students the educational attainment increases significantly with mindfulness, while for above average mindful students the relation is reversed and insignificant. A detailed regression table for education can be found in the Appendix Table 16.

Finally, subjective life satisfaction shows a significant positive correlation with mindfulness, which maintains highly significant also after controlling for demographic variables (Table 7, column 6). This shows that the more mindful a student is the more satisfied with his or her life the student is on average.

4.3 Discussion

The analysis of the determinants for variations in field behavior shows that mindfulness seems to be a good predictor for students' health and economic related behavior. Some of the results confirm the findings of other researchers (Black et al., 2012; Loucks et al., 2015; Bruin et al., 2011; Brown et al. 2011), while other field behaviors have not been analyzed in relation to mindfulness so far and are therefore new. To my knowledge, this is the first comprehensive overview of the relationship between mindfulness and health and economic behavior.

The finding that mindfulness decreases the propensity to smoke in this sample, confirms the results of a large study with Chinese adolescents ($N = 5,287$, mean age = 16.2 years) by Black et al. (2012). Using the same mindfulness measure (MAAS-A) they also find a negative correlation between mindfulness and smoking and furthermore establish that mindfulness might reduce decision-making processes that possibly translate into higher risk smoking behavior. Concerning drinking alcohol, the present study could not establish a relationship with mindfulness. However, Chatzisarantis and Hagger (2007) found a significant negative correlation between habitual binge-drinking and mindfulness in a sample of university students ($N = 292$, mean age = 19.48). One explanation for the null effect in this study might be that due to the fact that 81% of the sample reported to drink, drinking seems to be part of adolescents' normal behavior at this age. Therefore, a measure for the frequency of alcohol consumption or a dummy for excessive drinking might be better able to capture the expected moderation effect of mindfulness on drinking. Regarding the inverse link between mindfulness and BMI found in this study, there is evidence that mindfulness is negatively associated with obesity (Loucks et al., 2015). Generally,

there is quite extensive medical and psychological research that relates mindfulness to health indicators and establishes a causal relationship by showing that mindfulness interventions increase psychological and physical well-being of adolescents (see for example reviews by Black et al. (2009) and Burke (2010)). In these lines also the current study points into the direction that trainings enhancing trait mindfulness among adolescents may translate into positive health outcomes.

Now turning to the more economic related behavior saving and education, which have not been analyzed in depth in the literature so far. To my knowledge this study is even the first to analyze saving behavior and mindfulness. The fact that the probability to save only increases significantly with mindfulness for above average mindful students could be an indicator of the counteracting thoughts already discussed for impatience. On the one hand mindfulness leads to valuing the moment (spend everything) and on the other hand mindfulness is related to self-control (save now to buy something bigger in the future). Possibly, with increasing mindfulness, different mechanisms occur; up to a certain level mindfulness adolescents particularly value the present moment and spend their entire pocket money, while very mindful students are able to abstract from momentary feelings and are capable of self-control. Behavior related to school performance has also not been the core target of mindfulness research so far. There is some evidence pointing into the direction that mindfulness can improve academic learning and performance, however, there are no larger studies and there is a lack of robust evidence (Weare, 2013; Wisner et al., 2010). Mindfulness significantly increases the probability to attend a high-school for below average mindful students, but this effect is insignificant and reversed for above average mindful students (see Appendix Table 16). This could be an indication that mindfulness training might only have an effect on education for those with an initially low level of mindfulness.

The positive link between mindfulness and satisfaction found in this study has been documented in several studies before (e.g. using the MAAS-A: Bruin et al., 2011; Brown et al. 2011). Life satisfaction is not only desirable as such but has also been shown to mitigate harmful consequences of stressful life events and shield psychological and behavioral problems among adolescents (Park, 2004). Therefore, mindfulness may bring about further positive consequences in terms of subjective well-being.

5 JOINT ANALYSIS OF THE EXPLANATORY POWER OF FIELD BEHAVIOR

The previous results have shown that mindfulness and economic preferences are not correlated and are therefore not substitutable. In the last section it was shown that mindfulness has explanatory power for adolescents' field behavior and thus contributes to explain heterogeneity

in behavior that may translate into serious health and economic consequences. To analyze whether mindfulness and economic preferences complement each other in predicting field behavior a joint regression framework is used.

Before starting the joint analysis it is, however, necessary to show that economic preferences are able to explain variation in field behavior also in this sample. The pair-wise correlation table in the previous section (Table 6) showed that impatience is related to drinking alcohol and that both impatience and risk taking are associated with education. While these are pure correlations, Table 8 displays the results of a regression analysis in which control variables are included (gender, monthly pocket money, math and German scores, and the socio-economic background). Impatience still shows a significant positive coefficient for drinking, indicating that more impatient students have a higher probability to drink alcohol (which is in line with Sutter et al., 2013). In addition, impatience is negatively related to education, i.e. more impatient students are less likely to study in a school leading to an academic track (confirming findings e.g. by Golsteyn et al., 2014). In contrast, higher risk taking translates into a higher probability to study in higher level schools (in line with Dohmen et al., 2010). Finally, impatience seems to be positively associated with satisfaction, i.e. more impatient students are more satisfied on average.

Table 8: Regression analysis of field behavior and preferences

	Smoking	Drinking	BMI	Saving	Education	Satisfaction
Impatience	0.049 (0.064)	0.277*** (0.076)	0.075 (0.139)	-0.070 (0.066)	-0.176** (0.085)	0.460** (0.201)
Risk	0.082 (0.068)	0.065 (0.053)	0.101 (0.112)	0.060 (0.055)	0.194*** (0.073)	-0.057 (0.208)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	Probit	Probit	OLS	Probit	Ord. Probit	OLS
No. of Obs.	523	523	518	478	523	523
Adj./Psd. R ²	0.064	0.074	0.078	0.034	0.075	0.077

Robust standard errors clustered at the classroom level are displayed in parentheses. For Probit models average marginal effects are displayed. Impatience and risk are standardized to make effect sizes comparable. Control variables include gender, monthly pocket money, math and German score, both relative to the class, and socio-economic background. Stars represent the following p-values: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$.

These results and the findings from Section 4 show that both mindfulness and preferences are associated with field behavior. To analyze whether mindfulness and economic preferences complement each other a joint regression framework is used. Each field behavior is regressed on mindfulness, economic preferences, as well as some demographic control variables. Overall, the joint regressions lead to similar results compared to the separate regressions. Table 9 shows that the signs, magnitudes and significances of the regression coefficients of mindfulness, time and risk preferences do not change. In terms of health related behavior the joint regressions

show that mindfulness decreases the probability to smoke, while impatience increases the probability to drink alcohol. The coefficient of mindfulness for smoking and the coefficient of impatience for drinking are of about the same magnitude (both variables are standardized), thus their effect on the respective field behavior seems equally important. A one point increase in the standard deviation of mindfulness decreases the probability to smoke by 0.2, whereas a one point increase in the standard deviation of impatience increases the probability to drink alcohol by 0.2. More mindful students have a lower BMI on average. Risk taking shows no association with health related behavior. Concerning the economic related behavior, one can observe that mindfulness is non-linearly related to saving and educational attainment, while economic preferences are linearly related to educational attainment but are not related to saving. Impatience reduces the probability of attending a secondary school with academic track, while higher risk taking increases the probability. In relation to subjective well-being, the regression shows that life satisfaction increases with mindfulness and impatience, and that the effect of mindfulness on satisfaction is about 3 times higher than the effect of impatience.

Table 9: Regression analysis of field behavior, mindfulness and preferences

	Smoking	Drinking	BMI	Saving	Education	Satisfaction
Mindfulness	-0.201*** (0.058)	-0.007 (0.074)	-0.296** (0.130)	-1.492*** (0.552)	1.284*** (0.439)	1.630*** (0.200)
Mindfulness ²				0.439*** (0.152)	-0.378*** (0.132)	
Impatience	0.052 (0.064)	0.278*** (0.076)	0.077 (0.135)	-0.064 (0.064)	-0.182** (0.087)	0.460** (0.207)
Risk	0.073 (0.069)	0.065 (0.053)	0.082 (0.110)	0.059 (0.058)	0.197*** (0.073)	0.026 (0.228)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	Probit	Probit	OLS	Probit	Ord. Probit	OLS
No. of Obs.	523	523	518	478	523	523
Adj./Psd. R ²	0.082	0.074	0.086	0.046	0.082	0.165
Prob>chi2/F	0.000	0.000	0.001	0.000	0.000	0.000

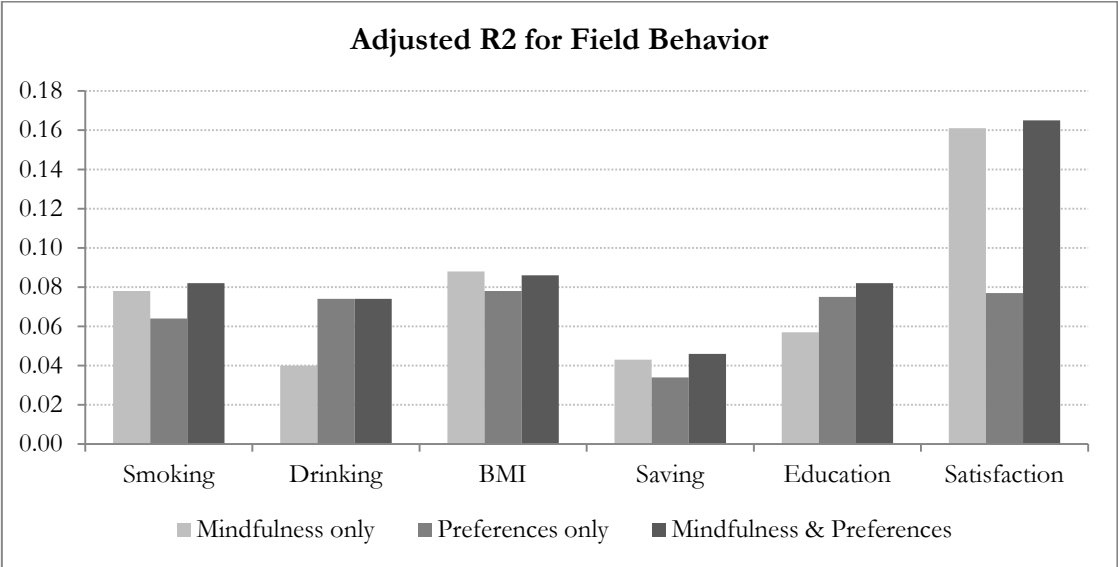
Robust standard errors clustered at the classroom level are displayed in parentheses. For Probit models average marginal effects are displayed. Mindfulness, impatience and risk are standardized to make effect sizes comparable. Control variables include gender, monthly pocket money, math and German score, both relative to the class, and socio-economic background. Stars represent the following p-values: * p<0.10, ** p<0.05, *** p<0.010.

Due to the significant gender difference in mindfulness, additional regressions were performed dividing the sample into boys and girls (see Appendix Table 14). Although, some effects seem to be stronger for boys or girls, the overall pattern remains. In general, the regression analysis points into the direction that mindfulness and economic preferences complement each other in predicting field behavior.

This hypothesis is further underpinned by an assessment of the explanatory power of mindfulness and preferences in isolation and in combination. Comparing the residuals from the

regressions (adjusted or pseudo R^2) allows to check the extent to which explanatory power varies when combining the two concepts and therefore enables to draw a conclusion regarding their complementarities. Figure 6 displays the R^2 's for the different field behaviors. Values range from 3% to 16% and vary between concepts and behaviors. One observes that it is either mindfulness or preferences explaining most of the variation and that adding the other concept does not improve the regression (but it also does not deteriorate the regression precision). In addition, all models have significant explanatory power as a whole and the joint hypothesis that all coefficients are equal to zero is always rejected at the 1% level (Chi2/F-statistics).

Figure 6: R^2 comparison for separate (mindfulness or preferences) and joint regressions of field behavior



In summary, the joint analysis shows that mindfulness and economic preferences seem to measure quite different non-cognitive abilities which complement each other in explaining heterogeneity in field behavior. This supports the results of other studies and substantiates the claim that both economic preferences and personality traits have predictive power and should be used jointly (see e.g. Becker et al., 2012). Furthermore, the finding supports recent efforts to integrate psychological personality concepts into theories of economic choice (see e.g. Borghans et al., 2008; Camerer, 2010; Almlund et al., 2011).

6 CONCLUSION

In a comprehensive experimental study with adolescents, the relation between mindfulness and economic preferences was explored. First, it was tested whether and how mindfulness relates to time and risk preferences. In a next step, it was analyzed whether there is a relationship

between mindfulness and field behavior. And finally, it was assessed whether mindfulness and economic preferences substitute or complement each other in predicting field behavior. The analysis was done with the help of a cross-sectional experimental study with 525 German secondary school students from the tenth grade (Age: $M=15.94$, $SD=0.64$, 261 girls (50%)). Time and risk preferences were elicited in a fully incentivized experiment. Mindfulness was defined as being able to regulate attention to an open and receptive awareness of present-moment experience and was measured by self-report using the *Mindful Attention Awareness Scale - Adolescents* (MAAS-A, developed by Brown et al., 2011). Students' field behavior included health related behavior (smoking, drinking alcohol and BMI), economic related behavior (saving and education), and subjective well-being.

Relating mindfulness to economic preferences, I find no evidence for a strong linear or non-linear correlation. This indicates that the two concepts represent rather distinct non-cognitive abilities and may play complementary roles in determining human behavior. While this is, to my knowledge, the first study relating mindfulness to time and risk preferences in a comprehensive framework, contradicting results have been found associating conscientiousness, a closely related concept, to economic preferences (Becker et al. (2012) and Mahalingam et al. (2014) find a positive link between conscientiousness and time preferences, whereas Dohmen et al. (2010) and Rustichini et al. (2012) find no relationship between this personality trait and time or risk preferences).

The analysis of the determinants of field behavior showed that mindfulness seems to be a good predictor for students' health and economic related behavior. In particular, I find that mindfulness reflects on a healthier lifestyle with more mindful students having a lower probability to smoke and a lower BMI. Furthermore, mindfulness is found to be strongly associated with higher life satisfaction. These findings are in line with the results of other researchers (Black et al., 2012; Loucks et al., 2015; Bruin et al., 2011; Brown et al. 2011). In addition, a non-linear relationship between mindfulness and saving as well as educational attainment is found. The analysis further revealed that impatience is related to a higher propensity to drink alcohol and that both impatience and risk taking are associated with educational attainment. Thus, both mindfulness and preferences have explanatory power for adolescents' field behavior and, therefore, contribute to predict behavior that may translate into serious health and economic consequences. In this regard, my findings indicate that the two concepts play rather complementary than substitutable roles. This implies that an integration of economic preferences and personality traits such as mindfulness may improve the analysis of potential sources of variation in life outcomes.

In addition, the findings of this study suggest that practices which enhance mindfulness among adolescents may be beneficial. For though mindfulness is regarded a human trait (e.g. Kabat-Zinn, 2003), there is concordance among researchers that it can be strengthened and cultivated by mindfulness-based practices (Brown et al., 2011). Indeed, interventions like the *Mindfulness Based Stress Reduction* program have been shown to increase mindfulness in adolescents, as measured by the MAAS-A (Brown et al., 2011). In contrast to mindfulness, it is unclear to which extent and how economic preferences are malleable (see e.g. Borghans et al. (2008) for a discussion). Therefore, as mindfulness reflects on a healthier lifestyle (less smoking and smaller BMI) and higher life satisfaction, the development of mindfulness skills might help students to grow social-emotional capacities and increase physical and psychological well-being.

This is exploratory work and more research is needed to further assess the relation between economic preferences and mindfulness. It remains unclear for example whether mindfulness and economic preferences indeed resemble distinct non-cognitive abilities or whether they are different aspects of another underlying human trait. Another avenue for future research would be to explore whether and how mindfulness training affects economic preferences.

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8 APPENDIX

Table 10: Regression analysis: mindfulness

	All	Girls	Boys
Male	0.100** (0.042)		
Raven	0.008 (0.017)	0.017 (0.030)	-0.002 (0.023)
Nb. siblings	-0.027 (0.024)	0.011 (0.029)	-0.070* (0.040)
FAS	0.005 (0.012)	-0.006 (0.015)	0.017 (0.015)
constant	3.228*** (0.192)	3.233*** (0.324)	3.337*** (0.208)
Model	OLS	OLS	OLS
No. of Obs.	525	261	264
Adj. R2	0.007	-0.009	0.017
Prob>chi2/F	0.019	0.750	0.225

Robust standard errors clustered at the classroom level in parentheses, P-values: * p<0.10, ** p<0.05, *** p<0.010.

Table 11: Regression analysis: future equivalent with upfront-delay

	OLS	Tobit	Tobit Interaction	Tobit non-linear
Mindfulness	0.056 (0.056)	0.073 (0.063)	0.062 (0.081)	-0.011 (0.643)
Mind. x Male			0.025 (0.105)	
Mindfulness^2				0.013 (0.101)
Male	-0.018 (0.057)	-0.013 (0.067)	-0.013 (0.066)	-0.012 (0.067)
Risk	-0.039* (0.020)	-0.042* (0.022)	-0.042* (0.022)	-0.042* (0.023)
First born	-0.058 (0.063)	-0.069 (0.070)	-0.069 (0.070)	-0.070 (0.071)
Pocket Money	0.002*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)
Raven	-0.009 (0.027)	-0.007 (0.032)	-0.007 (0.032)	-0.007 (0.032)
FAS	-0.047*** (0.010)	-0.051*** (0.012)	-0.051*** (0.012)	-0.051*** (0.012)
constant	5.383*** (0.317)	5.379*** (0.358)	5.418*** (0.411)	5.518*** (1.032)
No. of Obs.	524	524	524	524
Adj. R2	0.046			
Pseudo R2		0.027	0.027	0.027
Prob>chi2/F	0.000	0.000	0.000	0.000

Robust standard errors clustered at the classroom level in parentheses, P-values: * p<0.10, ** p<0.05, *** p<0.010.

Table 12: Regression analysis: Field behavior, mindfulness and preferences (future equivalent with upfront-delay)

	Smoking	Drinking	BMI	Saving	Education	Satisfaction
Mindfulness	-0.214*** (0.055)	-0.010 (0.075)	-0.305** (0.132)	-1.500*** (0.554)	1.229*** (0.458)	1.605*** (0.207)
Mindfulness^2				0.442*** (0.153)	-0.360*** (0.138)	
Future equivalent with upfront delay	0.183*** (0.058)	0.218*** (0.056)	0.196 (0.173)	-0.073 (0.052)	-0.214*** (0.067)	0.523** (0.203)
Risk	0.090 (0.069)	0.065 (0.053)	0.099 (0.108)	0.055 (0.059)	0.185** (0.072)	0.056 (0.227)
Male	0.253 (0.154)	0.140 (0.142)	1.038*** (0.300)	-0.026 (0.145)	0.011 (0.152)	1.691*** (0.449)
Pocket Money	0.062 (0.064)	-0.067 (0.063)	0.081 (0.144)	-0.111 (0.078)	0.054 (0.049)	-0.025 (0.198)
Math score	-0.325*** (0.070)	-0.293*** (0.070)	-0.162 (0.129)	0.137** (0.061)	-0.035* (0.021)	0.432** (0.208)
German score	0.104* (0.058)	0.003 (0.073)	-0.319** (0.140)	0.112 (0.073)	-0.025 (0.027)	-0.184 (0.260)
FAS	-0.120* (0.063)	0.103 (0.071)	-0.429*** (0.154)	0.092 (0.070)	0.326*** (0.064)	1.073*** (0.241)
constant	-0.861*** (0.102)	0.874*** (0.133)	20.890*** (0.196)	-5.117*** (1.789)		24.976*** (0.293)
Model	Probit	Probit	OLS	Probit	Ord. Probit	OLS
No. of Obs.	523	523	518	478	523	523
Adj./Psd. R2	0.094	0.061	0.090	0.046	0.087	0.167
Prob>chi2/F	0.000	0.000	0.000	0.000	0.000	0.000

Robust standard errors clustered at the classroom level are displayed in parentheses. For Probit models average marginal effects are displayed. Mindfulness, impatience (with upfront delay) and risk are standardized to make effect sizes comparable. Control variables include gender, monthly pocket money, math and German score, both relative to the class, and socio-economic background. Stars represent the following p-values: * p<0.10, ** p<0.05, *** p<0.010.

Table 13: Regression analysis: Field behavior, mindfulness (including mindfulness squared) and preferences

	Smoking	Drinking	BMI	Saving	Education	Satisfaction
Mindfulness	-0.789 (1.159)	1.228 (1.313)	-1.572 (2.516)	-2.871*** (1.061)	2.471*** (0.844)	3.473 (4.159)
Mindfulness^2	0.060 (0.176)	-0.184 (0.195)	0.149 (0.384)	0.439*** (0.152)	-0.378*** (0.132)	-0.050 (0.609)
Impatience	0.085 (0.103)	0.440*** (0.123)	0.126 (0.219)	-0.103 (0.102)	-0.291** (0.139)	0.736** (0.333)
Risk	0.043 (0.041)	0.041 (0.031)	0.047 (0.065)	0.035 (0.034)	0.117*** (0.043)	0.015 (0.135)
Male	0.254 (0.155)	0.165 (0.137)	1.049*** (0.302)	-0.030 (0.139)	-0.009 (0.150)	1.727*** (0.457)
Pocket Money	0.002 (0.002)	-0.002 (0.002)	0.002 (0.004)	-0.003 (0.002)	0.001 (0.001)	-0.001 (0.006)
Math score	-0.321*** (0.072)	-0.320*** (0.072)	-0.167 (0.129)	0.140** (0.061)	-0.026 (0.021)	0.411* (0.206)
German score	0.103* (0.055)	0.014 (0.070)	-0.321** (0.139)	0.114 (0.072)	-0.022 (0.027)	-0.191 (0.262)
FAS	-0.062** (0.028)	0.051* (0.030)	-0.196*** (0.067)	0.040 (0.030)	0.143*** (0.029)	0.464*** (0.108)
constant	1.199 (2.029)	-3.893* (2.349)	25.832*** (4.198)	4.624** (1.904)		4.997 (7.300)
Model	Probit	Probit	OLS	Probit	Ord. Probit	OLS
No. of Obs.	523	523	518	478	523	523
Adj./Psd. R2	0.082	0.076	0.085	0.046	0.082	0.163
Prob>chi2/F	0.000	0.000	0.001	0.000	0.000	0.000

Robust standard errors clustered at the classroom level are displayed in parentheses. For Probit models average marginal effects are displayed. Mindfulness, impatience (with upfront delay) and risk are standardized to make effect sizes comparable. Control variables include gender, monthly pocket money, math and German score, both relative to the class, and socio-economic background. Stars represent the following p-values: * p<0.10, ** p<0.05, *** p<0.010.

Table 14: Regression analysis: Field behavior, mindfulness and preferences differentiated by gender

	gender					
	Smoking Boys	Smoking Girls	Drinking Boys	Drinking Girls	BMI Boys	BMI Girls
Mindfulness	-0.064 (0.084)	-0.312*** (0.093)	-0.073 (0.120)	0.055 (0.099)	-0.078 (0.156)	-0.476** (0.180)
Impatience	0.184** (0.080)	-0.085 (0.084)	0.358*** (0.133)	0.216** (0.094)	-0.038 (0.166)	0.176 (0.153)
Risk	0.104 (0.102)	0.033 (0.084)	-0.061 (0.095)	0.224* (0.117)	0.144 (0.162)	0.015 (0.145)
Pocket Money	0.032 (0.069)	0.270 (0.165)	-0.077 (0.081)	-0.019 (0.126)	0.065 (0.145)	0.189 (0.335)
Math score	-0.364*** (0.096)	-0.276*** (0.095)	-0.442*** (0.086)	-0.213** (0.102)	0.014 (0.199)	-0.339* (0.173)
German score	0.082 (0.104)	0.136 (0.102)	0.056 (0.130)	-0.055 (0.115)	-0.347* (0.172)	-0.294 (0.186)
FAS	-0.118 (0.076)	-0.185** (0.092)	0.046 (0.116)	0.197 (0.124)	-0.514*** (0.183)	-0.416* (0.214)
constant	-0.617*** (0.111)	-0.876*** (0.107)	1.154*** (0.093)	0.939*** (0.142)	21.883*** (0.201)	20.844*** (0.195)
Model	Probit	Probit	Probit	Probit	OLS	OLS
No. of Obs.	263	260	263	260	262	256
Adj./Psd. R ²	0.084	0.111	0.129	0.062	0.022	0.078
Prob>chi2/F	0.000	0.000	0.000	0.000	0.021	0.001

	Saving Boys	Saving Girls	Education Boys	Education Girls	Satisfaction Boys	Satisfaction Girls
Mindfulness	-2.324*** (0.822)	-1.015 (0.744)	-0.125* (0.068)	0.037 (0.066)	1.599*** (0.203)	1.650*** (0.351)
Mindfulness ²	0.674*** (0.235)	0.303 (0.210)				
Impatience	-0.191* (0.111)	0.036 (0.082)	-0.165** (0.083)	-0.194* (0.110)	0.628** (0.304)	0.306 (0.329)
Risk	0.022 (0.067)	0.123 (0.085)	0.124 (0.079)	0.280** (0.123)	-0.103 (0.253)	0.154 (0.375)
Pocket Money	-0.204* (0.107)	-0.001 (0.106)	0.004 (0.058)	0.098 (0.129)	-0.031 (0.191)	-0.014 (0.430)
Math score	0.300*** (0.092)	-0.042 (0.119)	-0.097** (0.044)	0.055 (0.062)	0.201 (0.287)	0.634* (0.327)
German score	0.023 (0.092)	0.236*** (0.090)	0.086 (0.065)	-0.134** (0.066)	0.079 (0.402)	-0.481 (0.415)
FAS	0.102 (0.089)	0.043 (0.107)	0.376*** (0.092)	0.301*** (0.067)	1.024*** (0.301)	1.169*** (0.358)
constant	-7.832*** (2.724)	-3.535 (2.428)			26.791*** (0.291)	25.066*** (0.305)
Model	Probit	Probit	Ord. Probit	Ord. Probit	OLS	OLS
No. of Obs.	240	238	263	260	263	260
Adj./Psd. R ²	0.100	0.038	0.082	0.083	0.134	0.119
Prob>chi2/F	0.000	0.000	0.000	0.000	0.000	0.000

Robust standard errors clustered at the classroom level are displayed in parentheses. For Probit models average marginal effects are displayed. Mindfulness, impatience (with upfront delay) and risk are standardized to make effect sizes comparable. Control variables include gender, monthly pocket money, math and German score, both relative to the class, and socio-economic background. Stars represent the following p-values: * p<0.10, ** p<0.05, *** p<0.010.

Table 15: Regression analysis: Saving

	Model 1	Model 2 (non-linear)	Model 3 (below median ^a)	Model 4 (above median ^b)
Mindfulness	0.040 (0.058)	-1.492*** (0.552)	-0.197 (0.160)	0.331*** (0.110)
Mindfulness ²		0.439*** (0.152)		
Impatience	-0.071 (0.065)	-0.064 (0.064)	-0.135 (0.090)	-0.012 (0.097)
Risk	0.063 (0.057)	0.059 (0.058)	0.057 (0.079)	0.079 (0.089)
Male	-0.054 (0.132)	-0.030 (0.139)	0.025 (0.126)	-0.095 (0.225)
Pocket Money	-0.070 (0.095)	-0.111 (0.080)	-0.076 (0.117)	-0.109 (0.101)
Math score	0.140** (0.063)	0.140** (0.061)	0.198* (0.105)	0.083 (0.110)
German score	0.126* (0.070)	0.114 (0.072)	0.172* (0.101)	0.087 (0.087)
FAS	0.096 (0.068)	0.092 (0.069)	0.073 (0.087)	0.131 (0.088)
Model	Probit	Probit	Probit	Probit
No. of Obs.	478	478	232	246
Pseudo R2	0.035	0.046	0.056	0.044
Prob>chi2/F	0.001	0.000	0.001	0.000

Robust standard errors clustered at the classroom level in parentheses, marginal coefficients are reported, significance/p-values: * p<0.10, ** p<0.05, *** p<0.010

^a Only subjects that have a MAAS-A score below the median.

^b Only subjects that have a MAAS-A score above the median.

Table 16: Regression analysis: Education

	Model 1 Education	Model 2 Education (non-linear)	Model 3 Education (< median ^a)	Model 4 Education (> median ^b)	Model 5 High-school (Gymnasium) (< median ^a)	Model 6 High-school (Gymnasium) (> median ^b)
Mindfulness	-0.035 (0.053)	1.284*** (0.439)	0.097 (0.105)	-0.221 (0.148)	0.274** (0.120)	-0.221 (0.148)
Mindfulness ²		-0.378*** (0.132)				
Impatience	-0.175** (0.086)	-0.182** (0.087)	-0.181* (0.109)	-0.185* (0.104)	-0.150 (0.125)	-0.185* (0.104)
Risk	0.192*** (0.072)	0.197*** (0.073)	0.264** (0.107)	0.149** (0.068)	0.368*** (0.116)	0.149** (0.068)
Male	0.010 (0.155)	-0.009 (0.150)	0.070 (0.175)	-0.098 (0.168)	0.131 (0.217)	-0.098 (0.168)
Pocket Money	0.032 (0.047)	0.054 (0.052)	-0.025 (0.063)	0.191* (0.103)	-0.045 (0.076)	0.191* (0.103)
Math score	-0.024 (0.022)	-0.026 (0.021)	0.010 (0.060)	-0.064 (0.064)	0.052 (0.071)	-0.064 (0.064)
German score	-0.034 (0.028)	-0.022 (0.027)	-0.063 (0.071)	0.005 (0.061)	-0.096 (0.074)	0.005 (0.061)
FAS	0.323*** (0.065)	0.327*** (0.066)	0.228*** (0.085)	0.420*** (0.088)	0.236** (0.096)	0.420*** (0.088)
Model	Ord. Probit	Ord. Probit	Ord. Probit	Ord. Probit	Probit	Probit
No. of Obs.	523	523	254	269	254	269
Pseudo R2	0.075	0.082	0.066	0.109	0.112	0.109
Prob>chi2/F	0.000	0.000	0.000	0.000	0.000	0.000

Robust standard errors clustered at the classroom level in parentheses, for probit models the marginal coefficients are reported, significance/p-values: * p<0.10, ** p<0.05, *** p<0.010

^a Only subjects that have a MAAS-A score below the median.

^b Only subjects that have a MAAS-A score above the median.

EIDESSTATTLICHE ERKLÄRUNG

Erklärung zum selbständigen Verfassen der Arbeit:

Ich erkläre hiermit, dass ich meine Doktorarbeit „Risk taking and economic outcomes: The role of social context“ selbstständig und ohne fremde Hilfe angefertigt habe und dass ich als Koautor maßgeblich zu den weiteren Fachartikeln beigetragen habe. Alle von anderen Autoren wörtlich übernommenen Stellen, wie auch die sich an die Gedanken anderer Autoren eng anlehnenden Ausführungen der aufgeführten Beiträge wurden besonders gekennzeichnet und die Quellen nach den mir angegebenen Richtlinien zitiert.

Datum

Unterschrift