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of Business and Economics



SCHUMPETER DISCUSSION PAPERS

The heirs of Schumpeter:

**An insight view of students' entrepreneurial intentions at the Schumpeter School
of Business and Economics**

**Sascha Ruhle
Daniel Mühlbauer
Marc Grünhagen
Jens Rothenstein**

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Wuppertal, Germany

For editorial correspondence please contact
SSBEditor@wiwi.uni-wuppertal.de

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1 Integrating potential student entrepreneurs and their beliefs into models of University Entrepreneurship

There is little dispute about the economic and societal importance of entrepreneurial activity and new firm creation (e.g. Hessels et al. 2008); in particular, policy-makers in Europe have pinpointed the role of universities and other institutions of higher education in generating entrepreneurial activity in terms of university spin-offs and graduate start-ups – see, for example, the initiative to foster graduate entrepreneurship both at the Pan-European and national level (European Commission 2008; e.g. for the United Kingdom as described in NCGE 2008). However, despite general enthusiasm, it is far less clear what exactly contributes to the formation of entrepreneurial aspirations and intentions both in students and university scientists. This is especially virulent in view of the myriad of possible environmental, organizational and individual-level influences on entrepreneurial intentionality that have been suggested in the literature (generally, cf. Rothaermel et al. 2007 and Pittaway & Cope 2007 as far as entrepreneurship education is concerned).

With regard to graduates' and scientists' entrepreneurial intentions empirical studies suggest that both perceptions of social values attributed to entrepreneurship and personal competences may be important (Linan 2008; also see, for example, Mueller 2008; Walter 2008; Teixeira & Forte 2008; Goethner et al. 2009). Often, influences on entrepreneurial intentionality seem to mount into what Reitan (1997) has aptly phrased in three simplified questions *Can I do it?; Do I want to make it?; Would others approve?*. Apparently, university students (and other people) do not affirm all three questions in unison. In their study of Spanish students Guerro et al. (2008) found that while students find the option to found their own business desirable and attractive, perceived feasibility to found a venture may be substantially lower in university students (also cf. Walter & Dohse 2009 and Souitaris et al. 2007 as regards entrepreneurship programmes at universities). At the international level, empirical findings indicate substantial differences in students' entrepreneurial intentions and career aspirations across European and other countries around the globe (GUESSS 2008).

In terms of examining the possible antecedents of the formation of academics' entrepreneurial intentions within institutions of higher education, entrepreneurship research has come up with a plethora of environmental, organizational, personal, and situational fac-

tors (Rothaermel et al. 2007; Goethner et al. 2008; also cf. figure 1 further below). As also discussed in the latter (ibid. p. 3), this seems to be due to the fact that

- a) *studies on academic entrepreneurship* regarding universities' technology licensing and spin-off activities have largely focused on singular contextual influence factors (e.g. the role of the university organization and industry characteristics) but have somewhat neglected the scientists as those agents who potentially found university start-ups, and
- b) *studies on entrepreneurial intentions in general* have not been tailored to the specific situation of university members.

Roughly speaking, research on academic entrepreneurship has thus taken an input-output perspective at the system level, with an intermediate black box containing the people (i.e. scientists and students) who are actually to engage in entrepreneurial activity (be it to develop and licence a product from their research or to found a new firm based on their academic knowledge). Not surprisingly, the seminal paper by Rothaermel et al. (2007) has called entrepreneurship research to go beyond studying singular influence factors on aggregated entrepreneurial outputs and rather to develop more integrated models of how entrepreneurial activity at universities comes about. This paper suggests a route to such a model of academics' entrepreneurial intentions and their antecedents in the university context. Appreciating that the influence of exogenous, contextual influences on entrepreneurial intentions can only be indirect (Krueger 2000, p.8; Shepherd & Krueger 2002), i.e. mediated by changes in people's underlying attitudes and beliefs about entrepreneurship, the studied antecedents will be integrated into a model which captures dimensions of both the perceived attractiveness and the feasibility of becoming an entrepreneur from the perspective of university students. Our person-and-situation specific model explores the role of personal factors as well as characteristics of students' university studies (cf. Walter & Dohse 2008 who follow a similar structure in their set of explored independent variables).

Essentially, *this paper explores crucial antecedents of students' propensity to found their own business after graduation or in a few years time as a major output of the entrepreneurial university.* The afore-mentioned international GUESSS study (Global University Entrepreneurial Spirit Students' Survey) indicates heterogeneous levels of students' longer-term intentions to become an entrepreneur in their future careers, with Germany ranking at the bottom of the list. At the same time, entrepreneurship-policy

initiatives in Germany (e.g. the EXIST initiative by Germany's Federal Ministry of Education and Research over the last decade) have put substantial effort in building an infrastructure for entrepreneurship at German institutions of higher education. Therefore, it is of particular interest to study the potential institutional and student-related influences of entrepreneurial intentionality at a German university, which has been amongst the "early adopters" to devote university-wide attention to academic entrepreneurship; the students of such a university allow exploring what actually brings about intentions to become an entrepreneur and what does not. This paper analyzes data from 335 students at the *Schumpeter School of Business and Economics at the University of Wuppertal*. The presented results of the model may be used to fine-tune existing instruments to manage entrepreneurship programmes at universities and monitor the entrepreneurship culture of institutions of higher education (following the idea of Fayolle & Gailly 2005 that the influence factors on entrepreneurial intentionality identified in models like the one suggested in this paper can be the starting point for intervention measures aimed at improving the degree of entrepreneurial activity of university organizations).

The remainder of the paper is organized as follows After a short review of university entrepreneurship and research in students' entrepreneurial intentions, the authors embed their hypotheses within Ajzens (1988) "Theory of Planned Behavior". Subsequent to the survey construction and a brief sum up of the methodological procedure our results will be discussed and, with respect to the limitations, some conclusions will be drawn.

2 Theoretical Background

2.1 University Entrepreneurship

University Entrepreneurship is a vast field of research. Entrepreneurial activities of universities and other institutions of higher education (HEI) envelop “patenting, licensing, creating new firms, facilitating technology transfer through incubators and science parks, and facilitating regional economic development“ (Rothaermel et al., p. 692), without being completely explained by these aspects.

The current evolutionary stage of entrepreneurial activities in the field of higher education can be seen as a result of historical changes as universities and other organizations are embedded in country-specific education systems and institutions which have unfolded over centuries (cf. Wissema 2009). For example, in the US the Morrill Acts of 1862 and 1890 enabled each of the federal states in the US to control a portion of soil for educational purposes and liberally budget these institutions (Mowery et al. 2004). Later, the Patent and Trademark Law Amendments Act, P.L. 96-517, also known as the Bayh-Dole Act (BDA), established in 1980 generated a uniform policy of patenting and licensing inventions and innovations by universities, even if these novelties were fostered by public funds (Friedman & Silberman 2003, p.17). While the exact consequences of such changes in the legal regimes governing higher education still remain a matter of dispute, it is clear that any entrepreneurial activity within HEIs emerges in a rich context of endogenous organizational aspirations and reservations as well as exogenous institutional incentives and barriers (Etzkowitz 2003; O’Shea et al. 2005).

Based on historical evolution, attempts to analyze different aspects of universities handling licenses, patents, and spin-offs of new firms are combined in a branch of science broadly described as University Entrepreneurship (UE). According to Rothaermel et al. (2007) “(i) entrepreneurial research university, (ii) productivity of technology transfer offices, (iii) new firm creation, and (iv) environmental context including networks of innovation“ display four major fields of research within UE. Mowery and Shane (2002) divide UE in “the relationship between university research and private sector innovation, the mechanisms of technology transfer, the evolution of university technology transfer activities, and the creation of new firms to exploit university technology.“ (p.5). Even though the latter apply a rather discursive frame of reference while Rothaermel delivers a taxonomy of existing literature on entrepreneurship and research policy to

create a basic definition, both approaches reflect the general dimensions of UE as the sum of activities undertaken by universities and other educational institutions to take part in the entrepreneurial process¹. Figure 1 puts the different aspects of UE in context, reflecting them as a process of academic entrepreneurial activity undertaken by both university students and other faculty members in teaching and research. In the following this paper zooms in on the intentions and aspirations of the former to create their own business with their studies at university as a springboard (graduate entrepreneurship).

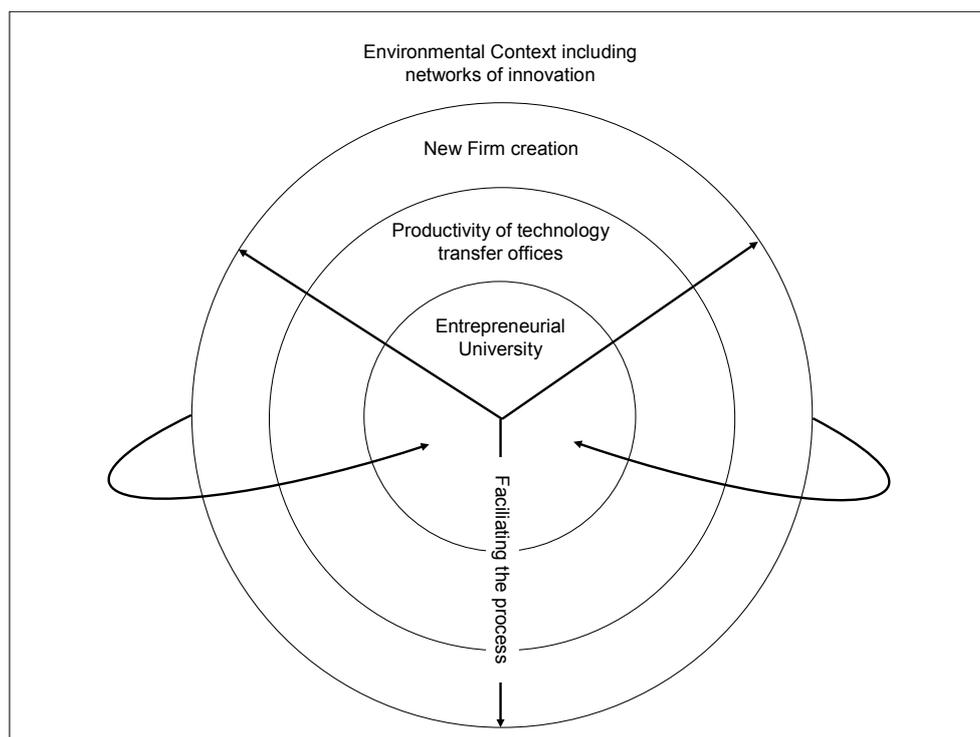


Figure 1 – Context Framework of University Entrepreneurship (Rothaermel et al. 2007 p.707)

2.2 Entrepreneurial University and New Firm Creation

Building a frame of reference for the analysis of students' intentions to found their own firm requires further introduction. The key to this objective involves linking the entrepreneurial intentions of university students (in this case at the Schumpeter School of Business and Economics at Wuppertal University, Germany) and new firm creation as a core dimension of University Entrepreneurship. The variables impacting upon founding

¹ Though a single comprehensive definition of the entrepreneurial process is not presented by literature, the authors have decided to use the basic display also presented by Volkmann/Tokarski (2006). Reviewing the historical development of the different definitions of entrepreneurship (e. g. Schumpeter (1934), Cantillon (1755), Hisrich/Brush (1985), Casson (1982), Knight (1921) or Hart/Stevenson/Dial (1995)) will not be the challenge of this article.

intentions and the probability of founding a new venture as a student or graduate are conceived to lie partly in the university and wider social environment of students *as they perceive it* (for example the supposed start-up support by the university or fellow students, but also perceived difficulties to found and run a venture as a university student or graduate; as suggested, e.g., in Walter 2008).

The different concepts of UE in the literature present major similarities, which allow the construction of a framework for empirical analysis. The process of universities becoming more and more entrepreneurial depends on factors internal and external to the institution. Rothaermel et al. (2007) establishes a range of potentially relevant dimensions regarding the entrepreneurial university (p.737) and new firm creation (p.761). These dimensions include incentive systems, status, location, culture, faculty, founding competences/ entrepreneurship education offers, policy, experience, defined role and identity, and technology (cf. figure 2 below).

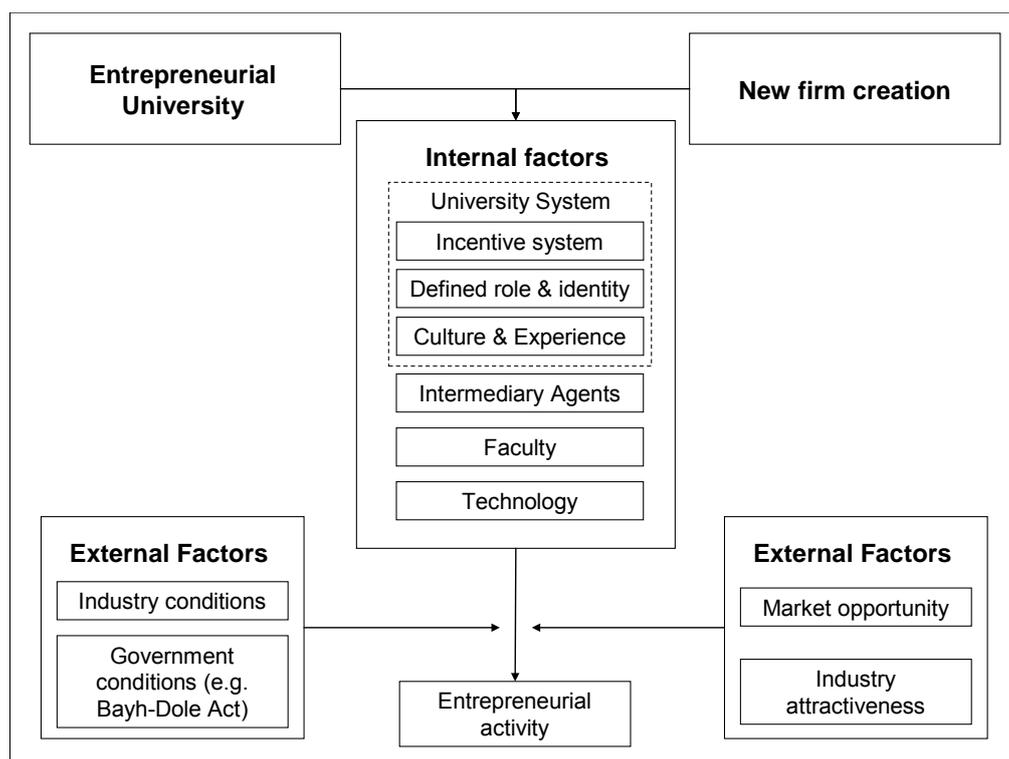


Figure 2 – Factors influencing academic venture creation (adapted from Rothaermel et al. 2007)

The internal factors presented above take a mediating role in the process of furnishing the theoretical constructs of the entrepreneurial university and new firm creation with concretely identified actions of individuals or groups.

2.3 Researching Students' Entrepreneurial Intentions

Venture creation can clearly be identified as a course of action. As shown later, human action and behaviour is nurtured by a variety of psychological propositions –in particular intentions and their antecedents – as the behavioural process unfolds. According to Frank, Korunka and Lueger (2002) entrepreneurial intention (in the context of graduate entrepreneurship) is “[...] the concrete personal estimation of the possibility of self-employment after completing academic studies [...]” (p.47).

2.3.1 Theory of Planned Behaviour

An accepted and widespread model of explaining human actions using the underlying intentions and belief structures in social psychology is the “Theory of Planned Behaviour (TPB)” (Ajzen 1988) (for its increasing relevance in entrepreneurship research in comparison to other models explaining entrepreneurial intentionality – namely Shapero’s entrepreneurial event model – see, e.g., Linan & Chen 2009; Connor & Armitage 1998; Cordano & Frieze 2000; Hrubes et al. 2001; Armitage & Connor 2002, Armitage & Arden 2002; Celuch & Slama 2002; Pavlou 2002; Jones 2003; Jimmieson & White 2004; Greenslade & White 2005; Broadhead-Fearn & White 2006; Elliot & Armitage 2009). Based on the earlier “Theory of Reasoned Action” (Ajzen & Fishbein 1980) (TRA), which concentrates on the analysis of “volitional behavior” (Celuch & Slama 2002 p.14), the TPB illuminates the process of human action by linking it to three core variables namely the *attitude toward the behaviour* (ATB), the *subjective norms* (SN) and the *perceived behavioural control* (PBC). Each of these variables is based on belief structures such as *behavioural beliefs*, *normative beliefs*, and *control beliefs*, which can be defined as basic assumptions each individual holds about the intended action. The basic model of the TPB is displayed in figure 3 below. It seems sensible to use the TPB concept for modelling entrepreneurial intentions since “starting a business constitutes a complex, distal behavior” (Krueger 1993, p.5) which will likely be conscious, voluntary, and purposeful and which can hardly be modelled as mere stimulus-response (Krueger et al. 2000). Also note that with regard to resulting founding action, intention is considered to be an important precursor of planned behaviour (Linan & Chen 2006; see also Baron & Ward 2004). Intent to found itself is assumed to be influenced by a range of antecedents as they are perceived in this case by students (Linan & Chen 2006; cf. figure 3).

Tying the TPB model architecture back in the above external and internal factors of university entrepreneurship, it is these factors which are supposed to mould students' behavioural, normative, and control beliefs towards starting their own business in the future. E.g., for the issue of students' perceived behavioural control to successfully carry out start-up activities, the quality of a university's support offers (e.g. a funding programmes for university start-ups or entrepreneurship courses to build students' founding competences) may propel or inhibit students' control beliefs; cf. Mueller 2008).

Attitudes toward the behaviour

The variable ATB “[...] refers to the degree to which a person has a [consistently]² favourable or unfavourable evaluation or appraisal of the behavior in question“ (Ajzen 1991, p.188). In other words, ATB reflects one's personal attraction towards a specific target behaviour like founding one's own business (see Ravis & Sheeran 2003 in general and Kolvereid 1996 or Mueller 2008 in the entrepreneurship context).

In fact, attitudes can rather be analysed by verbal³ expressed evaluations of possible behaviour, than by monitoring behaviour itself (Fishbein & Ajzen 1980 p.8). Attitudes may be separated from traits by the difference of an evaluative mindset (Ajzen 1988, p.7). Behavioural beliefs describe the attribution of an intention an individual performs with regard to the anticipated consequences of the behaviour in mind (Ajzen 1991, p.191); i.e., attitudes contain an affective dimension (like or dislike) as well as an evaluative, consequential dimension (potential subjective benefits from the target behaviour) (Linan & Chen 2006). Here, belief strength and evaluation of consequences have to be distinguished.

Subjective norms

² The adjective *consistently* is based on a definition of the term *attitude* according to Fishbein/Ajzen (1975). Consistency takes different shapes. Some objects may always resolve in the same action meaning positive or negative responses (stimulus-response consistency). It is also imaginable that different types of action in response to an object show characteristic similarity (response-response consistency). Furthermore actions can display a distinct type of individual evaluation concerning an object (evaluative consistency). (According to Campbell 1963 in Fishbein/Ajzen 1980: p.6f.)

³ Using a questionnaire the verbal character of attitudes in contrast to traits is included in the study. Verbal attitudes hold all cognitive, affective and conative reactions without further mentioning the exact specifics of these dimensions due to the formal restrictions of this paper (see Ajzen 1988).

The SN variable “[...] refers to the perceived social pressure to perform or not to perform the behavior“ (Ajzen 1991, S.188). Subjective norms are understood as “social pressures that people perceive from important others (Rivis & Sheeran 2003, p.218). For the focal behaviour under study individually perceived norms reflect the perception that ‘reference people’ would approve of the decision to become an entrepreneur or not” (Linan & Chen 2006, p.4). Ajzen (1988) deliberately separates the SN variable from norms in general, stating the specific importance of support by important others (e.g. peers, relatives, or friends) in the direct social environment of the individual. While an intended action may hold societal legitimacy according to general norms, the social environment such as family, friends and other possible role models may not approve it. SN are developed based on normative beliefs by evaluating the likelihood of socially influential others to approve or disapprove the intended behaviour. The belief structures are measured by the motivation the individual has to accommodate social pressure (Ajzen 1991, p.195).

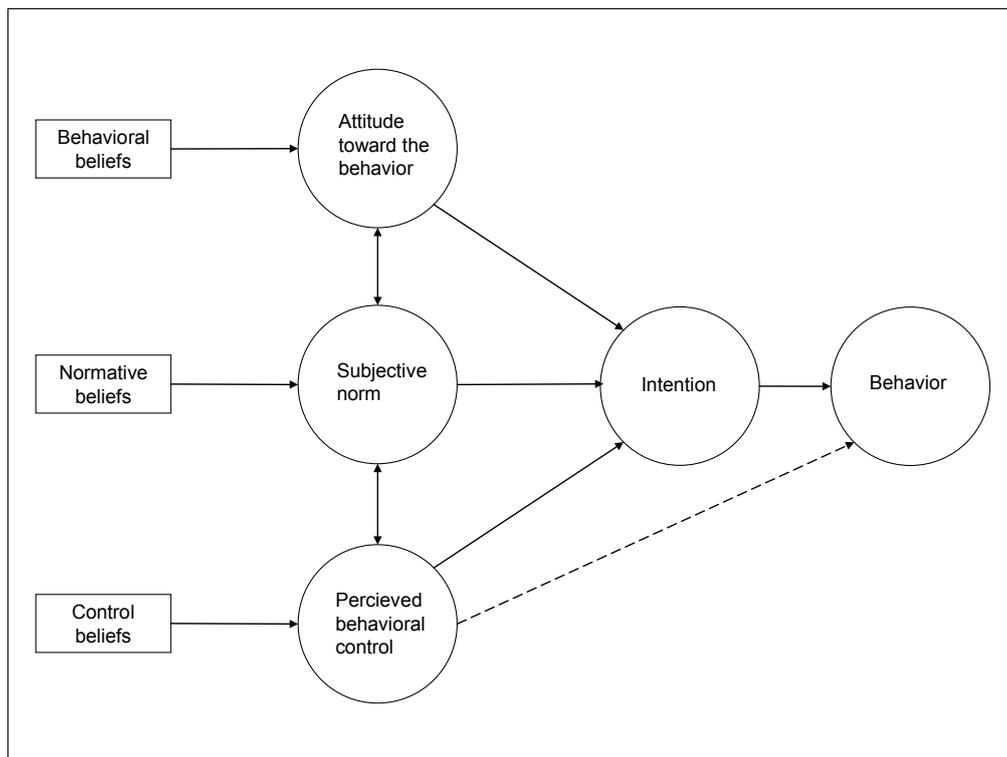


Figure 3 - Theory of planned behaviour (Ajzen 1988, p. 133)

Perceived behavioural control

PBC “[...] refers to the perceived ease or difficulty of performing the behavior [...]“ (Ajzen 1991, S.188). Based on the considerations of Bandura (1977) and the construct

of self-efficacy, PBC addresses the limitations of the earlier TRA which strictly refers only to measuring behaviour completely under the control of the individual. Besides the pure intention of performing an act, resources and opportunities enabling the individual to behave in the intended way are implemented in the TPB. Obviously, this is important to the case of founding a new business which requires a range of competences as well as setting up an initial resource base (Brush et al. 2001). The power the actor has over the intended action must be seen as a continuum of less or no controllability to more or complete controllability (Ajzen 1988, p.127). Yet again, the *perceived* controllability of the individual, and not the actual or realistic control, has a certain threshold to be reached in the process of human action (cf. Krueger 1993, who estimates that a threshold level of perceived feasibility will be required for intentions towards founding a business to occur). The control beliefs will determine the range of the controllability the individual perceives previous to the act. Overall, the perceived force of contribution identified by the actor with regard to the resources and opportunities defines the influence of PBC on the intended action.

Having presented the direct, immediate antecedents of intentionality (i.e. ATB; SN; PBC) now the general model of behavior intentionality and its antecedent influences will be put in the context of student entrepreneurship. Namely, we will relate the above broad internal factors suggested to impact upon university entrepreneurship in general (i.e. influences on licensing/ patenting/ start-up efforts by university researchers/ lecturers/students) to the specific antecedents of students' entrepreneurial intentions. Only then we will suggest distinct hypotheses for empirically testing and refining our model of students' founding intentions and their possible endogenous and exogenous influences.

Internal factors

The underlying evaluative mindsets in intending behaviour automatically chain the ATB, SN and PBC to the internal factors of UE. For internal factors to have an influence on students' intentions, two paths are to be considered. First, students themselves may primarily be influenced by the surrounding academic culture. Second, students' may be encouraged by members of the faculty, who themselves are influenced by the internal factors of the university system. The value of an intended behaviour within an organization for example depends on the internal *incentive system*. Positive connota-

tions can either respond to extrinsic or intrinsic dimensions of the intention to perform the behaviour influencing ATB. Certificates of attendance in specialized entrepreneurship classes, extraordinary credit points for extracurricular entrepreneurship activities or the possibility of attaining a desirable internship may count as incentive primarily targeting students extrinsically. Think Tanks (e.g. rooms in which interested students may seek advice or find supporting infrastructure for free) or the possibility to present their entrepreneurship ideas to professionals may influence students intrinsically. Friedman and Silberman (2003) identify the existence of a clear mission statement as a strong influence on positive evaluation of behaviour (p.29), also pointing out the positive effect of the *identity* of a university. An explicit mission also works as an indicator of norms surrounding the possible entrepreneur linking it to SN. Note the possibility of negative influences on entrepreneurial intentions. In the case of students being confronted by incentives contradictory of intended behaviour, they might be losing the interest in their initial ideas of founding a business. On the other side incentives could also target non-entrepreneurial behaviour negatively to support the opposite.

Culture, as an internal factor, has been object to economic research in many different contexts (see Schein 1985; Schreyögg 2003; Steinmann & Schreyögg 2005). Maurer (1973) defines it in contrast to nature as “creation according to human drafts” (p.823). Creation is at the same time the core behaviour of entrepreneurship in Schumpeterian Tradition. Planting a seed of constant creation within the members of faculty as well as the students of the Schumpeter School may reflect entrepreneurial behaviour as valuable and therefore influence the ATB. It also reflects the degree of social support to entrepreneurial behaviour. Furnishing a more theoretical point of view in teaching, not implementing entrepreneurial opportunities may have a rather negative effect on the entrepreneurial culture of a university. Note the close link between the faculty furnishing culture and the students experiencing culture. As to incentive systems, that is why faculty and students both have to be thought of as a collective body open to motivation within a culture carefully supported by distinct experiences supporting entrepreneurial intentions.

Intermediary agents, namely technology transfer offices (TTO) or technology license offices (TLO) mainly act as a mediator between academia and the private sector (Collins & Wakoh 2000, p.217). Their major objective is to lift as many inventions as possi-

ble to a saleable level in order to generate the arising income. Collins and Wakoh (2000) identify the availability of venture capital, the mobility of personnel, and the risk propensity of the involved staff as crucial conditions of a successful technology transfer (p.221). First of all, the existence of intermediary agents may break the ice with regard to the students' willingness to invent or create, lowering the assumed barriers to their intended behaviour. Furthermore, having an intermediary agent within the university may also influence the students' beliefs such as possible outcome of the creative behaviour. By also adding a notable amount of perceived controllability concerning the act of creating a venture, intermediary agents may influence ATB and PBC directly and indirectly via the connected belief structures. The point of view often reflecting the role of intermediary agents from will not be the focus of this paper, since the volitional maximizing of saleable inventions and the transfer to the market rather aims at the entrepreneurial activity of faculty. Nevertheless, intermediary agents are important mediators also concerning students' intentions to create businesses.

Another important factor within the process of entrepreneurial action is *faculty*. Universities, especially when seen as social networks, are dependent on the effort and motivation of their staff. In the context of academic venture creation faculty takes or opposes roles and identities, lives within cultures, reflects incentive systems implicit or explicit, works within intermediary agents and licenses technology. The increasing amount of academic patents succeeding the BDA is also a consequence of increased attendance of faculty in this process (Thursby & Thursby 2002, p.102). Also the amount of departments positively influences the amount of announced inventions (Friedman & Silberman 2003 p.25). For these reasons faculty is also expected to affect the intended behavior of venture creation within the student body of universities. Signaling a possible venture success and actively decreasing the amount of barriers encountered by possible entrepreneurs by either promoting entrepreneurship in corresponding lectures or involve in the process of starting a business the fear of failure should influence ATB and PBC. As the part of University directly interacting with students on various occasions, faculty is seen from a more cross-divisional angle. Hallett and Ventresca (2006) insist that institutions are brought to life by the individuals interacting within them. Therefore faculty also creates a sense of social surrounding to the students that may actively provide norms and consequently nurtures the normative beliefs indirectly linked with intention building of individuals.

2.3.2 Hypotheses

The first set of hypotheses (H1 a-c) follows a line of reasoning articulated in Linan (2009) “Based on the planned behaviour approach, it could be argued that individuals take their decision to create a new enterprise on three motivational factors his personal preference or attraction towards entrepreneurship, his perceived behavioural control, and the perceived subjective norms.” (ibid., 260; also see Goethner et al. 2009 for a similar framework on intentions towards university entrepreneurship by scientists). I.e., as depicted in figure 3 above, this study will *first* test possible direct influences on intentions at the attitude-level as suggested by TPB (namely ATB; SN; PBC); in a *second* step, we will then explore the impact of a range of exogenous factors (both environmental and individual-level influences) and their potential direct and indirect effects on intentionality (mediated by the above immediate antecedents towards entrepreneurial behaviour). [Note that other studies have omitted the antecedent attitude-level and tested only direct effects of environmental and demographic variables on entrepreneurial intention (e.g. Walter & Dohse 2009). However, we agree with Krueger (2000) that such exogenous influences “operate indirectly on intentions, only if they change the decision-makers attitudes” (Linan 2009, p. 260).

Attitude towards the behaviour

It is hypothesized that an individual’s entrepreneurial intention is influenced by the attitude toward the potential behaviour. In particular, one’s attitude towards a target action reflects the degree of personal attraction, in this case towards becoming an entrepreneur (cf. Ajzen 2002). In other contexts to which TPB has been applied the rationale that a positive attitude towards certain behaviour can enhance intentionality and therefore the probability of that behaviour has been shown, e.g., by Vinokur-Kaplan (1978) within the context of mothers and their intention to get another child (these findings were affirmed by Beale & Manstead 1991). Krueger et al. (2000) tested the attitude-intention-behavior proposition within a university context, measuring the entrepreneurial intentions of students, finding a significant influence of the ATB on intention (also cf. Gulbrandsen & Smeby 2005 arguing that university members will be more likely to engage in entrepreneurial activity when it is evaluated positively). To retest these findings at a German University, the following hypothesis will be tested

Hypothesis 1a

A person's attitude towards start-up behaviour affects entrepreneurial intentions positively.

Perceived behavioural control

Another core component of the TPB is the perceived behavioural control. It has been subject to many studies, because of its strong influence within the TPB. Most studies support the assumption that an individual's perceived easiness or difficulty to perform a task influence intentionality (Connor & Armitage 1998; Armitage & Connor 1999; Celuch & Slama 2002; Greenslade & White 2005; Hrubes et al. 2001; Jones 2003). In the entrepreneurship context, in particular the influence of perceived entrepreneurial self efficacy has been found to be relevant to explain entrepreneurial intentions; Bandura's notion of self efficacy reflects "a judgement of one's capability to accomplish a certain level of performance" (Bandura 1986 p. 391) and has been viewed to correspond to the PBC construct in TPB (e.g. Linan 2009). Below, we will further explore the impact of role models and obtained entrepreneurial and business skills which are typically related to perceived behavioural control (cf. Bandura 1997 who considers aspects like role examples and perceived enactive mastery of a task as elements of self efficacy). Before that, we will test the immediate impact of perceived behavioural control on entrepreneurial intentionality

Hypothesis 1b

Perceived behavioural control has a positive effect on entrepreneurial intentions.

Subjective norms

The last direct intention antecedent within the TPB framework is the supposed impact of subjective norms. The immediate social environment of a student could, as mentioned in chapter 2 above, change the perception of a possible course of action, namely to engage in self-employment during one's studies or after graduation from university. A person could be more inclined to becoming an entrepreneur, if building a business is valued by the close social surrounding of the individual (at university this may be work colleagues – for the context of researchers and lecturers; cf. Goethner et al. 2009 – or fellow students). If important reference people for students like parents, family, and friends positively judge entrepreneurial intentions, the choice of starting an enterprise is not only rewarded with the considerable advantages of being an entrepreneur, e.g. the great autonomy of decision, but also with the approval and perhaps also active resource support of that group.

Note that the prognosis validity and explanatory power of the SN variable is uncertain and sometimes not significant (Armitage & Conner 2001; for a further discussion of the comparatively low impact of SN on the extent of entrepreneurial intentionality, e.g. in cases of individuals with substantial internal control and action orientation, see Linan 2009). However, a number of studies found a positive connection between norms and intentions (Broadhead-Fearn & White 2006; Celuch & Slama 2002; Cordano & Frieze 2000; Geernslade & White 2005; Hrubes et al. 2001). Therefore the following hypothesis will be tested

Hypothesis 1c

Perceived acceptance by reference people (subjective norms) influence entrepreneurial intentions positively.

Next, the paper moves on to discuss possible exogenous context-level and individual-level influences on entrepreneurial intentions (either directly or indirectly through the above attitude layer).

Attendance in entrepreneurship courses and students' prior business apprenticeship experience

In terms of the contextual influences on students' intentions to start their own business (and their attitudes towards founding) the potential influence of specific entrepreneurship education at university first comes to mind. Indeed, over the last decades many universities have developed tailor-made entrepreneurship programmes entailing a differentiated portfolio of courses in entrepreneurial management, business planning, innovation, finance etc. (Mueller 2008; Volkmann & Tokarski 2009) – and so has the Schumpeter School of Business and Economics at Wuppertal University. The detailed impact of such programmes on the formation of entrepreneurial intentions in students (both at university and college) and other university members is still a matter of debate (see, e.g., Pittaway & Cope 2007; Walter & Dohse 2008; v. Praag et al. 2008). In this context it seems especially valuable to explore the impact of the attendance of entrepreneurship courses not only on focal intentionality itself, but mainly also on the ATB, PBC, and SN antecedents. This is because previous research has suggested that entrepreneurship courses may be beneficial in positively changing students' attitudes towards entrepreneurship (i.e. ATB) but less good in terms of enhancing perceived behavioural control (Walter 2008; Souitaris et al. 2006; for a deeper discussion of the effects of dif-

ferent types and formats of entrepreneurship courses on entrepreneurial intentions see Mueller 2008 and Walter 2008). By the same token in a sample of Spanish students Guerrero et al. (2008) found that students well consider the option of become an entrepreneur attractive but doubt that they have the skills required to become an entrepreneur.

Hypothesis 2 a

The attendance of entrepreneurship courses influences the attitude toward entrepreneurship positively.

Hypothesis 2 b

The attendance of entrepreneurship courses affects perceived behavioural control positively.

Hypothesis 2 c

The attendance in entrepreneurship courses influences perceived subjective norms positively.

In addition to entrepreneurship education at university, students, though still fairly young in terms of their professional career, of course also hold other sources of competences and skills that might contribute to perceived entrepreneurial capability. Typical examples of such sources and their impact on entrepreneurial intentions are professional business experiences (Teixera & Forte 2009) and prior entrepreneurial exposure (Krueger 1993; Ucbasaran et al. 2009). In the case of students in Germany, substantial business experience prior to university may stem from previous business apprenticeships. In particular, students' previous apprenticeships may have enhanced their perceived business, negotiation, and social skills that they may feel to be relevant for the task of setting up one's own business; hence, having done an apprenticeship may primarily impact upon students' perceived control.

Hypothesis 2d

A completed apprenticeship influences the perceived behavioural control positively.

Entrepreneur within the family

Following the theoretic foundation of the TPB the existence of role models is assumed to impact upon the core variables of the displayed model of building up intentions. Entrepreneurs within the direct social environment of the individual may function as such role models. This has been discussed in numerous studies according to Walter and Dohse (2009), however, the authors also diagnose that there is a lack of clarity concerning the nature of the relevance of such role models (p.12). They may transfer positive connotations and a live example of the entrepreneurial act as being rewarding as well as

manageable and attainable. Also the entrepreneurial spirit projected by a related entrepreneur may set terms of pressure for the individual to create a venture, too. Consequently, it is again useful to look into the possible effects of the existence of role models in terms of all three intentional antecedents.

Hypothesis 3 a

Having an entrepreneur within the close family influences the attitude toward entrepreneurship positively.

Hypothesis 3 b

Having an entrepreneur within the close family influences perceived behavioural control positively.

Hypothesis 3 c

Having an entrepreneur within the close family influences subjective norms positively

Citizenship

Furthermore a relationship between the cultural backgrounds of students and their willingness to start a business is assumed. In view of the potential cultural impact of the specific primary and secondary socialization context of students from different countries, the strength of the parameter values of the intentional antecedent variables within the TPB model may well differ across cultures (see Mitchell et al. 2002 discussing cultural influences on the business formation decision and its antecedents in an international context). The Global Entrepreneurship Monitor (GEM) (2008) measured amongst other things the different attitudes toward entrepreneurial activity in 43 countries. The population, differentiated in Factor Driven Economies (FDE), Efficiency Driven Economies (EDE) and Innovation Driven Economies (IDE) showed major differences concerning the perceived quality of conditions for venture creation (FDE = 53%; EDE = 48.1%; IDE = 39%). McMullen, Bagby and Palich (2008) found support for the hypothesis according to which entrepreneurial activity positively depends on economic freedom in their study on an older version of the GEM. For the context of university entrepreneurship note also that the Global University Entrepreneurial Spirit Students' Survey identified substantial heterogeneity in students' attitudes towards entrepreneurship and their motivation to start their own business in the future (GUESSS 2008).

The direction and nature of the causal relationships with regard to cultural differences is often unclear in international studies of entrepreneurship. Therefore, we merely assume

a distinct difference across a culturally diverse population as it is in our sample of students at Wuppertal University. Lee and Green (1991) support this assumption in their study by stating, that “the two samples [with different cultural backgrounds] exhibited substantial differences in the importance of personal attitudes and societal norms in determining behavioural intentions.” (p.9). Similarly, Abrams, Ando, and Hinkle (1998) found that the subjective norm variable was a stronger predictor of turnover intentions within different cultures. Because of the small size of single cultural sub-groups we only focus on inter-group differences between German students and students from other origins.

Hypothesis 4 a

Students with a German citizenship have a different attitude towards entrepreneurship compared to the other students.

Hypothesis 4 b

Students with a German citizenship have a different perceived behavioural control compared to the other students.

Hypothesis 4 c

Students with a German citizenship have different subjective norms compared to the other students.

In addition to the above core hypotheses of the model we will also explore the influence of typical characteristics of the body of students at a university – namely factors like students’ gender, age, degree course, and tenure. Towards this end, identifiable differences in the level of entrepreneurial intentionality and the parameter values of, e.g., perceived behavioural control and attitudes towards entrepreneurial behaviour offer starting points for university policies to foster entrepreneurship (cf. Goethner et al. 2009 following a similar line of reasoning for the case of scientist entrepreneurship at universities).

3 Methodology

Within this chapter the items, which were used to test the previously deducted Hypotheses will be explained. Focussed on the conceptualisation of the entrepreneurial intentions influencing variables, the way of item-creation, the pre-test, and the final survey will be explained.

3.1 Survey construction

The following section explains the construction of the survey. Based on a draft of Ajzen (2002), items were conducted to measure the different parts of the TPB. It was important for the authors to create a survey that could capture the specifics of students at a university. Their special situation was implemented within the questionnaire.

Basic population of the research design were only students at the Schumpeter School of Business and Economics. A survey within the whole student body of the Bergische Universität Wuppertal would have been even more interesting, the conclusions drawn within a single faculty can be a first hint of the entrepreneurial intentions in Wuppertal. The final version of the questionnaire used 43 questions. Knowing the pros and cons of different scaling types and the ambivalence-indifference problem, 32 questions used a positive coded seven-point Likert-Scale reaching from “1 = do totally not agree” to “7 = do totally agree”. The original version was in German and was translated for this article.

With guidance from Schnell, Hill and Esser (1999, p.174) the Item construction was based on the following main suggestions. The Items were kept simple, short and unambiguous, measuring mainly present attitudes, not past and trying to cover the whole field of interest, while questions with double negation have been avoided. These guidelines were again used after the initial pre-tests, of which the results will be integrated in the Item construction. With help of the corrected item-total correlation and the confirmatory factor analysis the selectivity and the item structure were checked.

3.2 Items measuring the Theory of Planned Behaviour

Entrepreneurial Intentions

As mentioned before the data collection served two primary goals. On the one hand it is the collection of descriptive data within the Schumpeter School, giving a detailed view of the entrepreneurial intentions, the perceived support of entrepreneurial activity and

the participation in firm creation. It was the researcher's curiosity to find out more about students at an often highly ranked faculty in the field of new firm creation. On the other hand it was conducted to test the TPB within the university context. To measure the different aspects of the entrepreneurial intentions four items were used. While "I intent to create a company within the next five years." should measure a rather short time span, the same question was asked with the long-term perspective "someday in my Life". The item "I would like to be entrepreneur, I just don't have the right idea." should measure the intention despite the missing of an idea. The cronbachs alpha was .77 and could have been increased to .87 by dropping the last Item, but the authors decided that with regard to contents the Item should be included.

Subjective norms

Three items were elated to measure subjective norms. Because SN describes the perceived image of entrepreneurship within the society, three different perspectives were included. "My closest family expects me to start my own business." tried to display the expectancies of the near social surrounding, while the negative coded item "My social environment expects me to graduate." considers the specifics of students, at a point where the ad hoc creation of a new firm is connected to the abort of the study. The cronbachs alpha was .76 with no significant possibility of further improvement.

Normative beliefs

The normative beliefs, which affect the subjective norms, were measured with two items. An example is "My Friends expect me to start my own business." In most research designs normative beliefs are analysed by more items, but based on the scope of the research and the complexity of the survey only two items were inquired and multiplied. So, no cronbachs alpha could be calculated.

Attitude toward the behaviour

This, in chapter two ample displayed, part of the TPB was itemized with four questions. While "Entrepreneurship has more pros than cons." tries to measure the personal value of entrepreneurship in the students. The reverse coded item "I would advise fellow students not to incorporate a business, even if they had a good entrepreneurial idea." reflected the negative view of the formation of a company. The last two aspects cover the perception of risks and sorrows, like "I think the situation of incorporating a business is very risky.". Cronbachs alpha was extremely low at .42. By dropping the only not re-

versely coded item, it could have been increased to .6. But with regard to contents the item was included. And like Cortina (1993) ascertained, cronbachs alpha may be low due to the measure of different dimensions, which could be the case for this part of the study.

Behavioural beliefs

Like the ATB, the behavioural beliefs were dissected by four items. Two of them measuring the power of the belief, like “The creation of a business is very attractive for me.” Items then were multiplied and added to the consequences of these beliefs as “Creating an own business would bring me material prosperity.” Cronbachs alpha was .85.

Perceived behavioural control

The final variable of the TPB is perceived behavioural control. It was measured by three items. During the pre-tests the risk of misunderstanding was expressed by the subjects, so the authors did review these. The aspect of controllability was put in focus. Finally the measured PBC ranged from the self-confidence with the creation, “I belief I could handle the creation of a new firm” to the completed controllability, “The complexity of creating a new firm would be easy to control for me.” With a cronbachs alpha of .71, the added items build the PBC.

Control beliefs

The control beliefs influencing PBC were measured by four items. Two items gauging each, the belief strength and the behaviour. An example for the first is “If I would like to, I could handle the creation of a new firm.”, whereas the latter is exemplified by “Being an entrepreneur means having certain skills and abilities, which I posses.”. Summing up these items built the control beliefs, with a cronbachs alpha of .73.

3.3 Items for the analysis

Entrepreneur within the family

To analyze the hypothesis concerning the influence of parents and the close social surrounding, the question “Are there any entrepreneurs within your social environment?” was used. Possible answers were *Mother, Father, Both, other Relatives*, and *None*. For statistical purpose, they were summed up to the dichotomy variable one or more entrepreneurs within the family. A closer investigation, depending on the results could be useful.

Theoretical and practical entrepreneurship knowledge

Within the questionnaire a block regarded the teaching of the entrepreneurship knowledge. The item for the theoretical knowledge is “The Schumpeter School conveys theoretical knowledge, which alleviate the creation of a new firm.”, and “The Schumpeter School conveys practical knowledge, which alleviate the creation of a new firm.” measures the praxis of creating an own business. Three more items were conducted but not used for hypothetical purpose.

Attendance in entrepreneurship lectures

The Schumpeter School of Business and Economics offers a wide spectrum of different lectures in Entrepreneurship. Like shown before, a significant connection between the attendance in these lectures and the entrepreneurial activity due the TBP is assumed. Therefore the quantity and kind of lecture were investigated further. It was possible to give different answers, *None, Chair of Professor Braukmann, Chair of Professor Fallgatter, Chair of Professor Koch/Volkmann, and other.*

Citizenship

After dropping the idea of assessing religious denominations, the citizenship of the students was recorded. It should give an indicator of the cultural heritage which the students are influenced by. The item was “Which Citizenship do you hold?” with the possible answers *German, Turkish, Russian, Chinese, or other.* It was explicitly asked for dual citizenship.

Control variables

As mentioned before the questionnaire contained 43 items, including some control variables, like sex, age, university tenure, aimed degree, finished apprenticeship, and previous entrepreneurial activity.

3.4 Measurement

The survey has taken place in January 2009, at the Schumpeter School of Business and Economics. Participants were mostly students of the Bachelor-, Master- and Diploma-programmes of all Semesters. The questionnaire was conducted at the beginning or ending of different lectures, tutorials and projects, with both authors present. It was fully anonymous and took around 15 minutes each.

3.5 Descriptive findings

400 forms were distributed to the students, 335 were returned usable, yielding a rather high rate of return of 83.75%. Table 1 shows a brief summary of the most interesting results. The average participant was 23.40 years old and studying within the 5th semester. 177 of the participants were female (53%) and 158 male (47%).

Table 1 – Descriptive results of the survey

variable	mean/total	standard deviation / percent
Age	23,40	3,71
Gender		
<i>female</i>	177	53 %
<i>male</i>	158	47 %
University tenure	4,17	3,73
Apprenticeship	80	24 %
'well coached' by:		
<i>chairs</i>	228	68 %
<i>administration</i>	190	57 %
entrepreneurial experience	15	5 %
aimed degree		
<i>Bachelor</i>	156	47 %
<i>Master</i>	56	17 %
<i>Diplom</i>	100	30 %
<i>other</i>	23	6 %
Citizenship		
<i>german</i>	275	82 %
<i>turkish</i>	8	2 %
<i>russian</i>	7	2 %
<i>chinese</i>	4	1 %
<i>other</i>	38	11 %
attendance (multiple answers)		
<i>Prof. Braukmann</i>	39	12 %
<i>Prof. Fallgatter</i>	55	17 %
<i>Prof. Koch/ Prof. Volk-</i> <i>mann</i>	78	23 %
<i>other</i>	9	3 %
<i>none</i>	210	62 %
entrepreneur within the family (multiple answers)		
<i>mother</i>	15	5 %
<i>father</i>	53	16 %
<i>other relatives</i>	152	45 %
<i>none</i>	132	40 %

Nearly a quarter did finish an apprenticeship before starting to study (24%) and almost 70% did feel well coached from the chairs within the faculty, only 57% found the administration to be good in coaching the students. 15 students had made entrepreneurial experience before. To avoid a positive bias towards entrepreneurial activities, they were removed from the analysis. After the regressions, a t-test was conducted to check for significant differences between the students with entrepreneurial experience and the other students.

After that it is possible to take a look at the items of the different scales. Entrepreneurial Intention had a mean of 3.78 based on the 1 to 7 agreement-scale. The highest antecedence value of EI was the perceived behavioural control with 4.35, followed by the attitude towards the behaviour (4.03) and the subjective norms (3.80). The belief items were multiplied and shouldn't be viewed on a 1 to 7 scale. Rather, they should be reflected within the possible min and max scale of 2 to 98. The control beliefs appeared strongest (38.63) followed by the behavioural beliefs (34.15). The normative beliefs turned out extremely weak (14.30). Table 2 shows the means and standard deviations.

Table 2 – Means & Standard Deviations from the TPB Variables

variable	mean	standard deviation
Entrepreneurial Intention	3.78	1.14
Attitude towards the behaviour	4.03	0.74
<i>behavioural beliefs</i>	<i>34.15</i>	<i>23.73</i>
Subjective norms	3.80	0.90
<i>normative beliefs</i>	<i>14.30</i>	<i>15.94</i>
Perceived behavioural control	4.35	1.41
<i>control beliefs</i>	<i>38.63</i>	<i>18.89</i>

Figure clarifies the development of the EI of the participants (blue), ATB (green), SN (beige), and PBC (purple). For presentational purpose even and uneven semester terms have been grouped. Each group represents the even and uneven terms, due to the limitation that students at the Schumpeter School can only enrol during the fall semester. An exception is group 7, which includes all students after the 11th term.

Most interesting is the development of the PBC. Students' perceived behavioural control reaches a rather high value of 4.26 in the first terms of their studies, then decreasing

to its lowest point in the next two semesters, before increasing to its maximum at 4.75 during the 7th and 8th term. Afterwards PBC slightly decreases again, but remains as the highest of all variables. Besides this development, the fluctuation of the other variables is rather stable. ATP slowly develops positive, while the subjective norms slowly decrease (with exception of term 9 and 10). The reported level of entrepreneurial intentionality is rather high at the beginning of one's studies but then decreases notably to 3.5 for students in their second and third years of studies. Interestingly, EI appears to be higher for students in their seventh and eighth semester, but is sharply lower for students already beyond their 11th semester (reaching 2.65). That might be due to the high losses of invested time in the aimed degree course which commonly have regular lengths with a maximum of nine semesters.

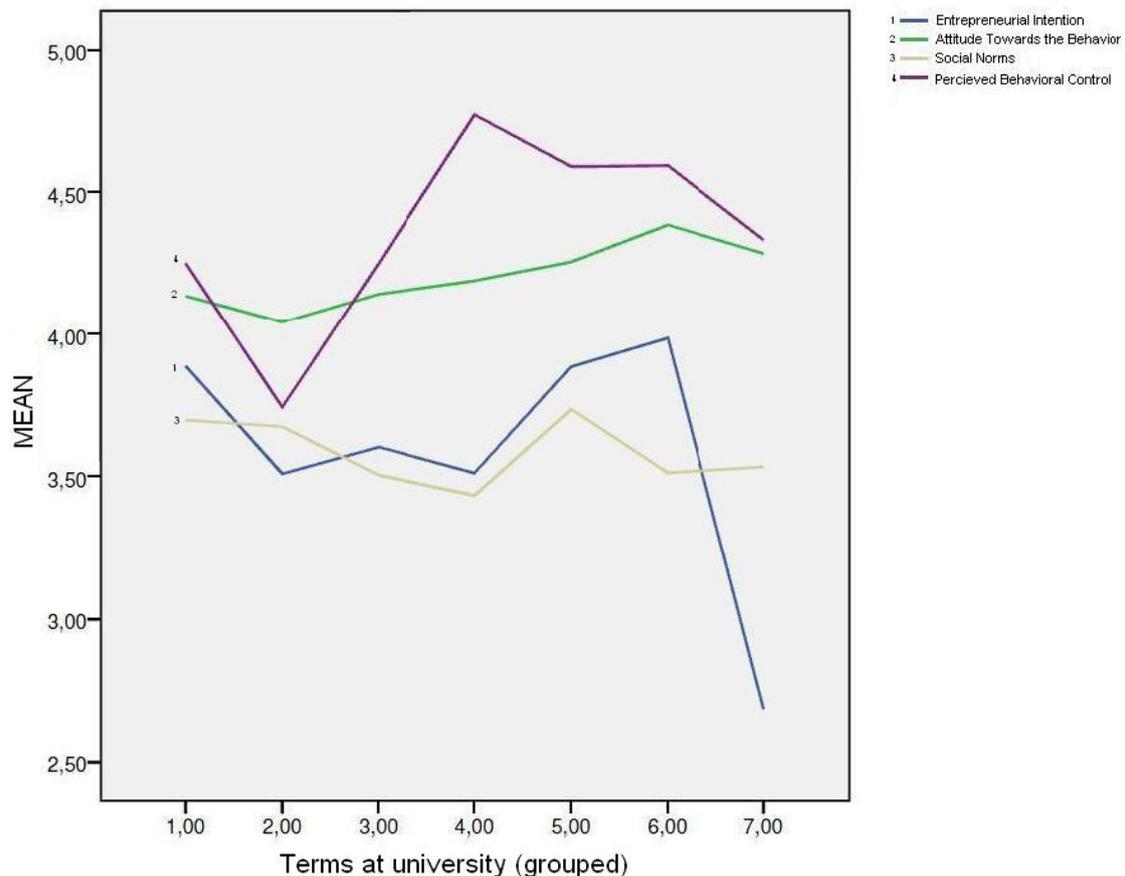


Figure 4 – Means of EI, ATB, SN and PBC at different terms at the Schumpeter School

Table 3 shows the bivariate correlations of the measured items. The EI variable shows a positive correlation with all core constructs and underlying belief constructs of the TPB. The coherence of the EI variable with the overall behavioural beliefs ($r = .75$) and with the PBC variable in particular ($r = .62$), is remarkably high. Some of the correlations must be explicitly considered in the university context and structural changes inside Schumpeter School of Business and Economics. The attendance in entrepreneurship modules is positively correlated with the PBC and the control beliefs, while it is related negatively to an aspired bachelor's degree. In a nutshell, all variables of the TPB are highly correlated with each other, indicating a multiple influence structure.

Table 3 – Bivariate correlations of the measured variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Gender	1,00													
2	Well coached by chairs	-0,07	1,00												
3	Well coached by administration	-0,03	0,57**	1,00											
4	Entrepreneurial intentions	0,25**	-0,06	0,04	1,00										
5	Attitude towards the behaviour	0,17**	-0,04	-0,04	0,27**	1,00									
6	Behavioural beliefs	0,24**	0,02	0,09	0,75**	0,37**	1,00								
7	Perceived behavioural control	0,26**	-0,03	0,06	0,62**	0,31**	0,71**	1,00							
8	Control beliefs	0,21**	-0,09	0,00	0,34**	0,18**	0,42**	0,69**	1,00						
9	Subjective norms	0,01	-0,08	-0,05	0,36**	0,17**	0,36**	0,31**	0,25**	1,00					
10	Normative beliefs	0,16**	-0,01	0,01	0,33**	0,13*	0,39**	0,29**	0,25**	0,41**	1,00				
11	Theoretical & practical ent. knowledge	0,04	0,29**	0,24**	0,09	0,05	0,12*	0,20**	0,19**	-0,01	-0,03	1,00			
12	Attendance in entrepreneurship-lectures	0,08	0,01	-0,02	0,01	0,08	0,06	0,12*	0,10*	0,01	0,06	0,12*	1,00		
13	Entrepreneur within the family	-0,02	0,01	-0,04	0,05	-0,03	0,04	0,09	0,12**	0,08	0,14*	0,01	-0,01	1,00	
14	Entrepreneurial Experience	0,09	-0,15**	-0,07	0,11*	0,09	0,23**	0,22**	0,24**	0,17**	0,14*	-0,04	0,13*	-0,02	1,00

*. The Correlation is at .05 (two-tailed) significant.

** . The Correlation is at .01 (two-tailed) significant.

4 Results

Following the hypothesis, a regression including the behavioural beliefs, the ATB, SN, and PBC was calculated, showing a construction error with a low R^2 . After checking for possible causes, the authors came to the conclusion that too few items have been assembled to check the beliefs and their three core components. The theoretical discussion of that will follow at the end of this article during the reflexion of possible limitations. For statistical purpose the core variables and their beliefs were integrated in one item each.

Afterwards another regression for EI itself has been calculated, of which the results are presented in Table 4. The regression is significant at $p < .001$ with $F(2,292) = 14.61$. To test the suggested hypotheses for the TBP-Variables three more regressions were calculated, one for each core characteristic.

Table 4 – Results of the Linear Regression for the Entrepreneurial Intention Variable

Variable	standardized β coefficients	significance	ΔR^2	R^2
<i>Control - Regression</i>				
age	.044	.44		
gender	.232	.00		
<i>EI - Regression</i>				
SN	.19	.00		
PBC	.27	.00		
tenure	-.11	.03		
apprenticeship	-.03	.43		
citizenship	-.06	.09		
entrepreneurship knowledge	-.05	.15		
attendance in entrepreneurship	.01	.79		
entrepreneur within the family	-.02	.60		

The high R^2 for the EI – Regression of .66 is mainly driven by the highly significant ATB, SN and PBC antecedents, supporting hypotheses 1a to 1c. The tenure of students seems to slightly abate the EI, with a $\beta = -.11$. Interestingly, entrepreneurial intentions are significantly influenced by gender. Male students seem to have a higher EI than female students.

The three core characteristics can only be measured with a relatively weak adjusted R² of .10 for the ATB ($p < .001$ with $F(2,303) = 4.80$), .15 for the PBC ($p < .001$ with $F(2,303) = 8.16$), and .09 for the SN ($p < .001$ with $F(2,303) = 4.38$). This and the other significant relations are shown in Figure 5. These regressions were used to test the other hypotheses.

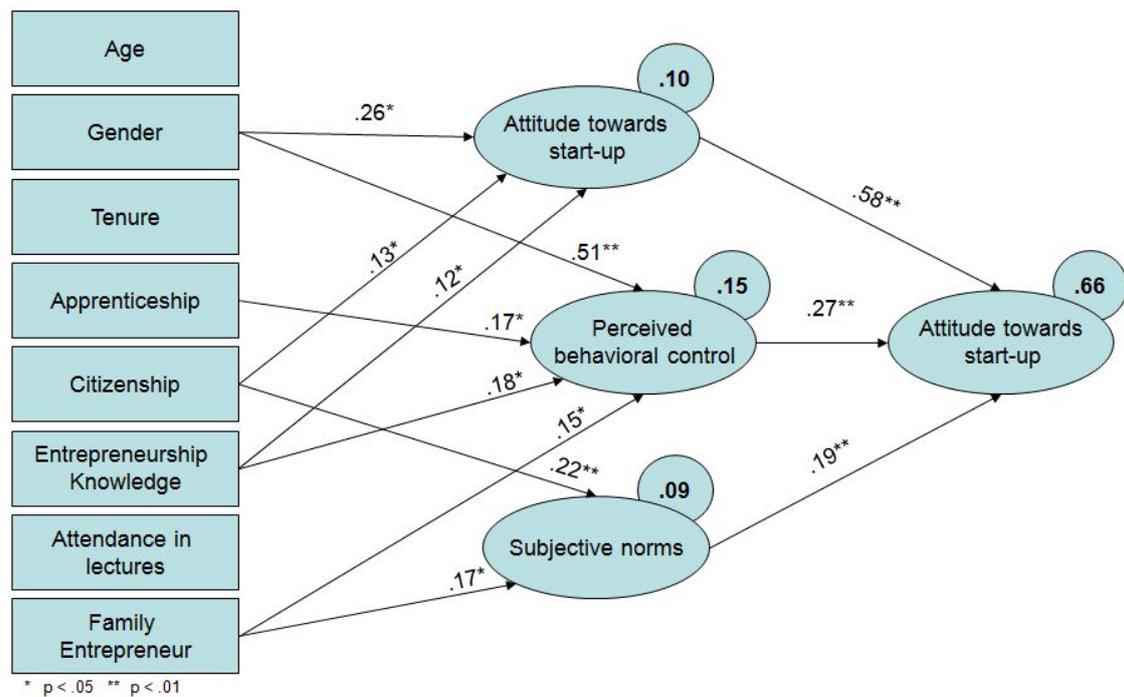


Figure 5 - Results of the Linear Regressions

Therefore, hypotheses 2a – 2c had to be rejected due to missing significant coefficients, not supporting the relationship between the lecture attendances and the three core variables. Indications regarding the attendance in entrepreneurship lectures could thus not be supported, because there was no substantial relation to any of the three core variables. However, mixed or counter-intuitive results with regard to the influence of entrepreneurship education measures on entrepreneurial intentionality are not uncommon in empirical studies of graduate entrepreneurship; this will be addressed further below in the discussion of the results.

Supporting hypotheses 2d with a moderate significant $\beta = .17$ ($p < .10$), a positive influence on the perceived behavioural control due a completed apprenticeship has been found. A mixed picture must be contemplated for the next three assumptions. An entrepreneur within the family did not have a significant influence towards the attitude to-

wards entrepreneurial behaviour (H 3a), but towards the perceived degree of control $\beta = .15$ ($p < .10$) and the subjective norms $\beta = .17$ ($p < .05$), thus supporting hypotheses 3b and 3c.

While a positive relationship between citizenship (German versus other origins) and the attitude towards starting a business (H 4a) with $\beta = .13$ ($p < .05$) and the subjective norms (H 4c) $\beta = .22$ ($p < .001$) supported the corresponding hypotheses, an influence between students' citizenship and their perceived behavioural control (H 4b) was not found. A significant influence from a student's gender can be found for one's attitude towards a possible start-up (H 5a) $\beta = .26$ ($p < .05$) and the perceived behavioural control (H 5b) $\beta = .51$ ($p < .001$). However, the last hypothesis relating to students' gender has been rejected, finding no evidence for a different view on subjective norms between female and male students (H 5c).

For a further analysis on the impact of the attendance in entrepreneurship lectures, a t-test has been conducted, comparing the ATB, PBC, SN and EI of students with one or less finished courses with the sub-sample of students who had visited two or more lectures. The results indicate an interesting difference based on the intensity of attending entrepreneurship courses as shown in Table 5. Except from the social norms variable, all other variables differ in their significance between the two groups. How these results can be interpreted, with consideration of the results from the linear regression, will be discussed in the following chapter.

Table 5 – Results of the comparison of means (students' attendance in entrepreneurship lectures)

Attendance in lectures	Attitude towards start-up	Perceived behavioural control	Social norms	Entrepreneurial Intentions
1 or less	4,12**	4,26**	3,64	3,71*
2 or more	4,50**	4,90**	3,60	3,99*

*. The difference is at $p < .05$ significant.

** . The difference is at $p < .10$ significant.

5 Results

In the following sections the findings introduced above will be discussed alongside the four hypotheses groups (H1a-c to H4a-c), including possible policy implications and ideas for further research. At the end of the chapter we will present important limitations of our study.

5.1 Discussion of Findings

H1a-c: The Core Components of TPB

Overall, the theory of planned behaviour appeared to be a very useful model to explain the entrepreneurial intentions of students at the Schumpeter School. The three core components (ATB, PBC and SN) did all show a very high influence on the students' intention to create a start-up, explaining nearly 66 percent of its variance. The strongest impact seems to be coming from the individuals' attitude towards starting one's own business (.58 in the overall model). This corresponds with other studies within the entrepreneurial and non-entrepreneurial context (e.g. Krueger 2000; Hrubes et al. 2001). Practically, this would suggest entrepreneurship courses and seminars at the Schumpeter School to focus at least as much on improving the attitude of the students towards entrepreneurship as on building students' entrepreneurial capabilities. In other words, it seems valuable to foster students' positive evaluations of self-employment as a career option since positive attributions (both affective, e.g. dis-/like, and evaluative, e.g. personal benefit) may increase entrepreneurial intentionality (Linan & Chen 2006; see Gulbrandsen 2005 again and also the discussion of the impact of entrepreneurship education in H2a-c below); note though that often students find becoming an entrepreneur desirable anyway but disbelieve the feasibility of founding a business as a student (Guerrero et al. 2008).

However, not only ATB, but also the other two components showed a significant positive influence on students' intentions (.27 PBC; .19 SN). The self-assessment of PBC, namely the individual's entrepreneurial competencies has a major impact on his or her intentions. Here it could be asked whether there is a supportive range of students' perceive feasibility to found their own venture, which would enhance entrepreneurial intentions. On the one hand, it may require a minimum threshold of perceived feasibility in terms of one's personal capabilities to found and run a business (Krueger 1993). On the

other hand, it has been assumed that too much knowledge of the complexity and risks involved in the process of creating a new firm could rather have a detrimental effect on entrepreneurial intention, even though it did not have a negative influence within this data pool (cf. Goethner et al. 2009; also see Oosterbeek et al. 2008 for a discussion of possible negative effects in the context of trying to improve students' knowledge about entrepreneurship in class). To conclude the discussion of a suitable range of perceived behavioural control or feasibility note that personal threshold levels both to initiate entrepreneurial activity and continue with it over time may be subjective (cf. Davidsson 1991 and Fallgatter 2005). Finally, the social norms variable was the weakest of the three core components of TPB, though still having a significant positive influence; this supports the proposition made by Guerrero et al (2008, p. 48) that accommodative social norms have a positive impact on the desirability to start a new business. It may thus be possible to increase the chances of a student's entrepreneurial career by improving the views held about entrepreneurship and self-employment as a profession in the social reference groups of students since the immediate social environment constitutes relevant subjective norms. While this may be difficult (and perhaps also not viable) for universities in practice, it shows at least that there are, of course, substantial influences outside university organizations which impact upon students' intentions and attitudes towards entrepreneurship (e.g. in terms of beliefs held about self-employment in society and resources available to entrepreneurs). Therefore, on the one hand, institutions of higher education should be aware of the limited reach of their efforts in entrepreneurship education and support. On the other hand, universities (and other institutions) can take an active role in improving the overall culture for entrepreneurship, treating students and graduates as future opinion leaders in society (this broader perspective on entrepreneurship education has been advocated in Koch 2003 and Volkmann 2009).

Knowing that the three components ATB, PBC and SN have a significant influence on entrepreneurial intentions has further theoretical and practical relevance. First, it provides further another evidence for the theory of planned behaviour within an entrepreneurial context. Even if some problems during the elevation of variables have been found, the TPB seems to be robust and useable in explaining student intentions. Second, showing the strong importance of students' attitudes towards entrepreneurship within the results, this may offer new starting points to increase students' entrepreneurial activity in the context of higher education. Knowing the importance of students' attitudes as

well as feasibility perceptions, a further specialisation within these concepts could be very fruitful. In university management practice it will be essential for policy measures and entrepreneurship education offers to know which components of entrepreneurial intentionality such measures might address. I.e., for tailoring and fine tuning entrepreneurship programmes it is useful to understand that students' broader attitudes towards entrepreneurship and their reflective social norms as well as their skills and capabilities may be targeted at. Correspondingly, entrepreneurship researchers should try to further elicit the different antecedent dimensions of EI rather than merely exploring and testing the direct effects of exogenous individual and context-level variables immediately on the EI variable (as suggested in Walter & Dohse 2009). This study, as well as numerous others, has indicated that there are different cognitive constructs at the psychological attitude level towards a target behaviour which may be distinguished, namely the ATB, PBC and SN components, which should thus not be dropped in EI models. However, additional effort needs to be put in capturing and measuring these components, aiming both to identify better measures and (possible) additional antecedent dimension of EI. While it was possible to prove the three main hypotheses (H 1a- H 1c), supporting the theory of planned behaviour, the three core concepts could not be explained as well. It seems that the ATB, PBC and SN constructs are much more complex than anticipated, which has also been the case in other studies. Like Linán (2008) the R^2 was rather small and indicates the need of a deeper conceptualisation of antecedences. None the less some interesting influences could be found or have been rejected.

H2a-d: The influence of Students' Education

The linear regression did not show a significant relationship between the number of lectures finished and any of the core components within our model (H2a-2c). This is contrary to findings from Linán (2008) who found a significant influence of entrepreneurial skills on the entrepreneurial intentions of university students, or other authors who found a significant negative influence (e.g. Oosterbeek et al. 2008). However, the mixed results of the impact of entrepreneurship education measures on entrepreneurial intentions suggests that the effect of entrepreneurship courses and modules (or integrated programmes) may depend on underlying qualitative and quantitative factors, e.g. the length and intensity of the entrepreneurship education programme or the format of the courses (e.g. theoretical/practical; interactive) that students attend (cf. Mueller

2008). With regard to the length and intensity of entrepreneurship education, the comparison of means did indeed show significant differences between students visiting one or none courses and students with two or more lectures, with exception of the social norms. This indicates that the influences of learning more about entrepreneurship and the intention to start a new firm are very multilateral and will require further exploration. In terms of educational format, Walter and Dohse (2009) found a significant influence for *active* modes of entrepreneurship education, but not for *reflective* modes. As noted above, such a separation of different course formats was, however, not in the focus of our broader study on the context of entrepreneurial intentions at the Schumpeter School. However, differentiating between different types of courses appears to be logical step for future research.

The results obtained should create an awareness of possible relationships, hidden within the basic causal assumption that increasing people's knowledge about entrepreneurship should increase the level of entrepreneurial intentionality and, ultimately, the number of entrepreneurs. Even though there was no traceable negative influence towards any of the variables shaping entrepreneurial intentions, a deeper analysis of this issue would be useful to improve our knowledge on how entrepreneurship education offers should be designed to actually improve entrepreneurial activities. This is in view of the still valid assessment made by Suitaris et al. (2006) and Walter (2008) that has proven quite difficult to strengthen students' entrepreneurial intentions through entrepreneurship education; it appears to be particularly difficult to improve the entrepreneurial skill set in a credible way for students to truly believe in their personal ability to found and established their own business; what may be comparatively easier is to try to develop positive attitudes about an entrepreneurial career. Appreciating the results above, a useful idea could be to improve entrepreneurship courses by including more role models, namely (both successful and less successful) entrepreneurs, perhaps not so much because they may enhance the perceived feasibility of founding a new business but also because they may help to improve attitudes towards entrepreneurship. The active integration of presentations held by experienced entrepreneurs, including interactive question and answer sessions, could be a viable way to increase the core components of entrepreneurial intentionality. The influences of role models, which could be found, e.g., in students' families, will be discussed after a short look at hypothesis 2d.

Another hypothesis, which has been supported by the data, was the positive influence of a completed apprenticeship on the perceived behavioural control to found and run a business (H2d). This could be because students who have gone through an apprenticeship feel that this enhanced their business, negotiation, and social skills relevant in business life. These findings correspond to the influence of professional business experiences on PBC identified in the study by Teixeira and Forte (2009). Basically, the feeling of succeeding in a prior task (like a business apprenticeship) could also enhance the perception of an individual's self-trust and capabilities. Employing this mechanism could also be tried in entrepreneurship courses. For example, students could be given chances to succeed in business simulations, management games or business contests to improve their self-efficacy.

H3a-c: The role of Entrepreneurs in Students' Families

Continuing the discussion from above, role models may be important in forming students' views about entrepreneurship; such models may of course not only relate to the university context, but also to the personal environment of the students. A positive influence of a role model could be found for the family of the students. Having such role models seems to influence the perception of control and the subjective norms towards entrepreneurship positively (H 3b-3c). Interestingly, the relationship between having an entrepreneur in the closer family and the attitude toward a start-up was not significant. This could be due to the multiple influences that knowing an entrepreneur could have on the attitudes of a person towards entrepreneurship. An analysis concentrating exclusively on this issue could, for example, explore how different types of entrepreneurs and their successes and failures could help to gain more detailed insights into the ways in which entrepreneurs in one's family influence dimensions of entrepreneurial intentionality.

H4a-c Cultural Differences

Another way to improve the entrepreneurial intentions of the body of students and graduates could be the integration of different cultures within the university. Supporting hypotheses 4a and 4c differences in the citizenship of students do indeed affect the attitudes and social norms with regard to new business creation. Building on this, a cluster analysis should be made to get a more detailed view of the different cultural backgrounds of students and, beyond this, the effects of students' multi-cultural exposure at

university. In terms of the views held about self-employment, students with a foreign (i.e. other than German) citizenship did not show a higher level of perceived behavioural control. While the idea that living and studying abroad requires a certain self-perception seems quite logical, still the perceived level of personal skills and capabilities needed for being an entrepreneur are not higher in the foreigner group. It seems possible that the reasons for being at a foreign university could be an essential moderator and should be recognized in further studies. This seems worth to be explored further in future research as the Bologna process and other changes in the institutional environment of universities as well as the more and more international study paths could push more students into foreign cultures. Should exposure to foreign cultures of students' – particularly at German institutions of higher education – effectively influences attitudes towards entrepreneurship, then education organization which strive to become an entrepreneurial university may want to take on board more foreign students in their admission policies and international programmes.

The Impact of Students' Gender and Age

Finally, a difference in ATB, PBC, SN and the EI between the genders could be partially supported. Only perceived subjective norms were not influenced by students' gender. For the other TPB components and EI itself significantly higher values were found for male students. Though, with regard to earlier studies, this result is not surprising, it helps to throw light on the factors that explain entrepreneurial intentionality. It seems that, even with the many existing programmes to increase the rate of female entrepreneurs in Germany, female students appear to be significantly less inclined to start their own business than male students. The findings in this study coincide with findings from Goethner et al. (2009) except for differences in ATB which does not show significant differences in this study. Corresponding to the study of Goethner et al. (2009) for the context of male and female researchers, also in our study the comparatively lower level of entrepreneurial intentions in female students seems to be mediated by their lower degree of perceived behavioural control and self-efficacy when projecting the foundation of one's own business. This finding may be the starting point for more tailor-made policies to foster female graduate entrepreneurship in terms of substantial efforts to improve entrepreneurial skills and their application as well as perceived resource support – however bearing in mind the general difficulties to influence students' perceptions of behavioural control in the entrepreneurship context. Finally, the age of

students did not have a measurable impact on any of the TPB core components, perhaps because of the quite narrow range of the age of students in the study.

5.2 Limitations and Concluding Remarks

First and foremost, the initial separation of the actual attitude, control and norms variables and their underlying beliefs could not be sustained (cf. the discussion in chapter 3.2 above). Therefore, looking at the distinction between the two variable levels more closely could be useful, figuring out whether these two different levels are really separable or if there would be no loss of information when collapsing the two into one level of intentional antecedent variables (such a strategy of simplifying the TPB model efficiently has been tried in previous studies, e.g., for the case of entrepreneurship in Walter & Dohse 2009). Second, only one University has been subject to our analysis, which, of course, cannot be seen as a representative image of the heterogeneous university landscape in Germany, let alone within the European context; furthermore, only students of one faculty have been questioned. However, it has been the core idea of this study to explore students' entrepreneurial intentions at a faculty like the Schumpeter School of Business and Economics, which has dedicated substantial efforts to innovation and entrepreneurship. None the less the results can well offer insights into the views and intentions of German business and economics at universities focussing on entrepreneurship in their curriculum. Finally, though rather constituting an internal aim, the study also fulfilled the goal of creating a stock-check of the students at the Schumpeter School of Business and Economics. With this knowledge, future researchers can compare their own results with this study.

With these limitations in mind, the above study has identified potential influencing factors on students' entrepreneurial intentions at a university, which has an elaborate support infrastructure for entrepreneurship in place like Wuppertal. The study has validated the relevance of the core components of TPB, namely the influences of attitudes and norms as well as perceived behavioural control towards entrepreneurial activities to found and run one's own business. The establishment distinct components and dimensions of what constitutes and brings about high or results in low levels of entrepreneurial intentionality offers a platform for a targeted university management and education-policy-making. Such policies could be directed at improving students and graduates attitudes towards self-employment as a career option or at trying to build capabilities in

students and graduates (in terms of skills and knowledge as well as perceived resource support) so that they consider it both attractive and feasible to become an entrepreneur in their present life phase or in the near future.

In terms of exogenous influences on these variables and the final entrepreneurial intentions construct we have identified the influence of students' completed apprenticeships and multi-national cultural backgrounds, both may be relevant to student admission policies at universities trying to establish entrepreneurship as a theme at their organization (e.g., in bachelor- or master-level entrepreneurship majors). Finally, the suggestions with regard to group-specific differences in the components of entrepreneurial intentionality provide starting points for entrepreneurship education policies directed at certain target groups.

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