

**Entrepreneurial Intentions of Business Students:
A Benchmarking Study**

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Abstract.

It is widely accepted that the educational system of universities has to provide an academic environment that may serve as a catalysts for high-technology start-ups. The academic tradition of entrepreneurship in German-speaking countries is very short. Until recently, fostering innovations and new product development through entrepreneurship has not been regarded as a primary task of universities. However, perspectives have changed in this respect, and there have been numerous attempts to enhance the role of university graduates as founders of innovative businesses. In this paper, we compare the entrepreneurial intentions of students at two German-speaking universities (the Vienna University of Economics and Business Administration and the University of Munich) with the corresponding results for a leading institution in this field: Massachusetts Institute of Technology (MIT). We find very distinct patterns of entrepreneurial spirit in these universities. The results also suggest that the lower level of founding intentions among students in Munich and Vienna may be attributed to their less distinctive entrepreneurship education. This leaves a great deal of room for improvement.

Key words: entrepreneurship, education, universities, cross-national comparison

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1. Introduction

In recent years, fostering entrepreneurship has become a topic of the highest priority in public policy throughout most industrial countries. In this context, well-educated entrepreneurs are of paramount interest. It has been found that the self-employed more often have a formal university education compared to people in wage and salary employment (Robinson and Sexton 1994; Brüderl 1998). In addition, the economic impact of companies (measured by job creation, growth, and other indicators) founded by university alumnae/i is also more significant (Dietrich 1999; Richert and Schiller 1994).

The United States have a comparatively long tradition of fostering entrepreneurs at universities and business schools. While the first entrepreneurship courses were taught at Harvard Business School as early as the 1930s, this field has seen increasing attention since the 1970s. By 1990, 400 universities in America were already active in entrepreneurship education, and current estimates exceed 700 (Vesper and McMullan 1988; Hills and Morris 1998; Fiet 2001). Progress in this field has thus been extremely impressive. An often-cited study carried out by BankBoston underlines the significant impact that outstanding universities exert on new venture creation: If the 4,000 companies founded by MIT graduates and faculty formed an independent nation, it would have the 24th largest economy in the world (Ayers 1997). Another prominent example is Stanford which has close ties to many of the cutting-edge companies in Silicon Valley (Pfeiffer 1997).

German-speaking countries have been comparatively slow to recognize these opportunities. Until recently, fostering entrepreneurship has not been regarded as a primary task of universities. The first chair in entrepreneurship studies was not established until 1997 (at the European Business School in Oestrich Winkel), and a study by Minks (1998) found that only 7% of degree program graduates in Germany were self-employed four years after graduation. Similar numbers can be reported for Austria and Switzerland. However, fostering entrepreneurship through education and training has also received increasing attention from universities in German-speaking countries in recent years. For example, 42 chairs in entrepreneurship were established between 1997 and 2001 (Klandt and Heil 2001). In addition, several universities have designed entrepreneurship education and training programs without establishing dedicated chairs (Kofner, Menges and Schmidt 1999).

In this paper, we compare the entrepreneurial intentions of students at two German-speaking Universities (the Vienna University of Economics and Business Administration and the University of Munich) with the corresponding results for a leading institution in this field, the Massachusetts Institute of Technology (MIT). By comparing the situation at typical German speaking universities with a top ranked US institution, we aim to develop a better understanding about the process of initiation, development and support of entrepreneurship among students. More specifically, the present survey investigates the antecedents that may explain why differences of entrepreneurial intentions evolve across student populations. Based on extant literature, internal personality factors (i.e. the students' attitudes toward self-employment and their personality traits) and external contextual factors are integrated into a conceptual model of the entrepreneurial decision process.

The results show that the *intention* to start a company is significantly lower among the German and Austrian students than among MIT students. However, the internal variables regarding personality and attitude towards self-employment variables that have been identified as important antecedents to become an entrepreneur (i.e. the students' attitudes toward self-employment and their personality traits) are at a comparable level in both samples. In contrast, huge differences are visible in the perceived environment. Specifically, the universities in Vienna and Munich are considered to be far less conducive to entrepreneurial development. Our findings indicate that entrepreneurial intentions may be enhanced since they are associated with factors that are, at least partly, under the schools' control. On the basis of these findings, we cautiously conclude that German-speaking universities are in a favorable position to foster entrepreneurship among their graduates.

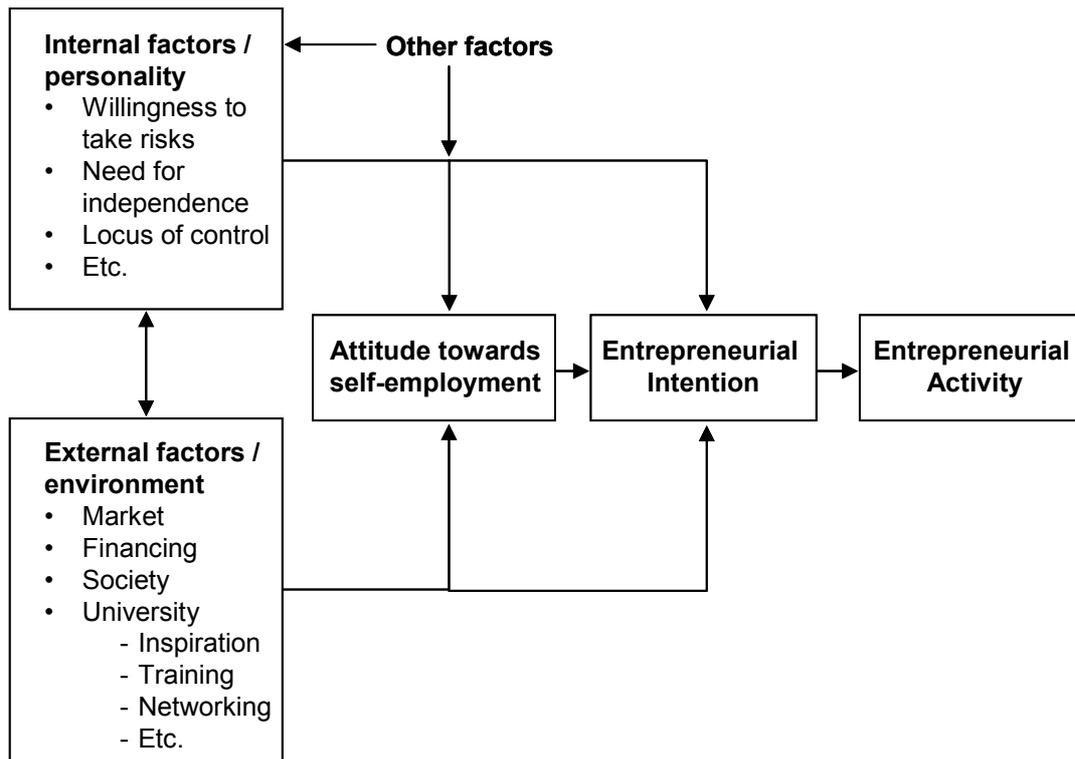
The paper is structured as follows: In Section 2, we briefly review the literature on the effects of the universities' entrepreneurship education and training on students' entrepreneurial intentions. We then describe the methods applied in the study (Section 3) and present our findings (Section 4). Section 5 discusses the implications and limitations of the results.

2. Literature Review: Factors which Impact Students' Entrepreneurial Intentions

A long tradition of research is devoted to the question of why some people choose to be self-employed and start their own businesses and others are rather inclined to seek traditional wage or salary employment. A number of conceptual models structure the various factors that affect this process (e.g., Bygrave 1989, Moore 1986). Although not specifically developed for students, they might explain their entrepreneurial intentions as well as the intentions of any other population. Most approaches distinguish between internal and external (environmental) factors (figure 1).

Figure 1

A conceptual model of the entrepreneurial decision process



The discussion of *internal factors* that might determine people's career choices has been dominated by models that strive to identify stable personality traits and attitudes. The personality approach to explaining entrepreneurial tendencies has a long tradition in entrepreneurship research, a tradition which can be traced back to McClelland's work in the 1950s (McClelland 1961). Since then, a number of personality traits, such as risk-taking propensity (Hisrich and Peters 1995), the need for achievement (Johnson 1990), and locus of control (Bonnett and Fuhrmann 1991), have been discussed as factors affecting people's aspirations to start a company. Empirical research has revealed contradictory findings about the role of personal characteristics (Brockhaus 1987; Robinson, Huefner and Hunt 1991). Generally, these differences are explained by the fact that personality theories are intended for use across a broad spectrum of situations and therefore measure rather general tendencies – which makes them lose their efficacy in any specific context. There seems to be an interactive process between personal characteristics and the environment in which people act (Herron and Sapienza 1992; Naffziger et al. 1994). Risk-taking propensity, for instance, is likely to vary according to the entrepreneur's specific environment. However, when cross-situational differences are taken into account, there seems to be some empirical support for the notion that personality does in fact matter in people's career choices (Sexton and Bowman 1986). As an enhancement of the (somewhat unsatisfactory) models focusing on personality traits, the *concept of attitude* has been integrated into more recent conceptual frameworks. Attitude instruments have proven to account for a large part of variance in widely varied behavior (Ajzen & Madden 1986; Ajzen & Fishbein 1980). Consequently, Robinson, Huefner and Hunt (1991) propose the more specific attitude theory to predict entrepreneurial careers. The importance of domain-specific attitudes in understanding (future) business

founders has also been recognized and empirically supported by other researchers (e.g., Autio et al. 1997; Kolvereid 1996).

As mentioned above, *external factors* are often thought to explain why the connection between personality traits and attitude on the one hand and career aspirations on the other is not deterministic in nature. Here we focus on a variety of social, economic and educational contextual variables that may influence people's willingness to become an entrepreneur (e.g., image of entrepreneurs in society, availability of funds). In this context, a very prominent external factor influencing the students' decision process is, of course, found in the universities and their didactic activities (Béchar and Toulouse 1998).

Consequently, the impact of education on the creation of future entrepreneurs and the link between university training and the success of new ventures have been the subject of much discussion in the academic community. A review of entrepreneurship literature reveals contradictory findings (see Gorman, Hanlon and King 1997). The results suggest a differentiation between general business and specific entrepreneurship education when exploring the role of university programs.

Most of the surveys show that education in *entrepreneurship* encourages graduates to start their own businesses. In an early study, Clark surveyed a sample of students at a medium-sized American university who were enrolled in an introductory entrepreneurship course. He found that almost 80% of these students were considering setting up their own businesses, and their plans were often turned into reality. Three out of four students who indicated concrete plans to found a company did, in fact, start a new venture. Furthermore, 76% of the respondents stated that the entrepreneurship course had a strong or very strong effect on their decision to found a new business (Clark, Davis and Harnish 1984). McMullan, Long and Wilson report a high rate of new venture creation among MBA students who attended more than three entrepreneurship-related courses at a Canadian university (McMullan, Long and Wilson 1985). A review of a graduate enterprise program in the UK suggests that the program provided more than half of the participants with an incentive to start their businesses sooner than intended. Thus, this initiative had an enabling and accelerating impact on the graduates' founding activities. (Brown 1990). Irish students who participated in a student business plan competition indicated that the initiative had a "very important" impact on their subsequent career choices (Fleming 1994). Finally, Vesper and McMullan show that entrepreneurship courses help alumni make better decisions in the startup process (Vesper and McMullan 1997).

A note of caution should be mentioned at this point: A large portion of the studies cited are exploratory and based on the analysis of individual courses or programs. Very seldom did the surveys include longitudinal data, control groups without experience in entrepreneurship education or pre-tests prior to exposure to the courses. In addition, there is still a need for valid empirical measures of the characteristics and outcomes of entrepreneurship education (Hills and Morris 1998). Yet the great majority of empirical findings support a legitimization process in entrepreneurship education. Apparently, entrepreneurial aspirations and success can be taught.

Unlike entrepreneurship programs, *general business management* education seems to have no significant influence on entrepreneurial intentions (Hostager and Decker 1999). The findings of a survey of business owners in India suggest that management education is not an important driver of entrepreneurial attitudes (Gupta 1992). Whitlock and Masters even show that interest in pursuing self-employment dissipates after visiting general business courses (Whitlock and Masters 1996). Chen et al. (1998) surveyed students in various business majors and showed that the number of management courses taken had no effect on entrepreneurial decisions. These findings underscore the need for education programs specifically designed to expand students' knowledge and experience in entrepreneurship. Content and teaching methods have to be differentiated for courses in entrepreneurship and in traditional business (McMullan and Long 1987; Vesper and McMullan 1988).

3. Study Methods

3.1. Study Preparation and Measurement

This study aims to benchmark the entrepreneurial situation at "typical" universities in German-speaking countries against the entrepreneurship status of one of the leading US academic institutions. Through a comparison of students' personality traits, attitudes towards entrepreneurship and perceptions of contextual factors, we aim to shed some light on international differences in entrepreneurial intentions among students. This, in turn, should help us gain insight into how, if at all possible, university administration and faculty could foster new venture creation among their graduates.

The survey focuses on students of business administration. In order to prepare the questionnaire, we conducted 20 exploratory interviews with faculty members, students, and other experts (e.g., program directors, entrepreneurship center management, etc.). We also held two group discussions with 20 student participants (in order to generate items) and five written pilot studies (in order to select and test items) with a total of 107 respondents. Our selection of items was based on Cronbach's alpha analysis (personality trait and attitude constructs) and on importance ratings (environmental factors, university education and training) provided by students.

Most measures are self-exploratory and are explained in the findings section. Three constructs used in this survey were based on standard scales, while one was self-generated. All four performed rather well (Table 1). In order to measure the perception of contextual factors, we selected ten items centered around market-related, financial and governmental issues. Entrepreneurial support at the universities was covered by six items dealing with aspects such as training, active support and networking.

Table 1:
Constructs Used in the Study

<i>Construct</i>	<i>Item generation</i>	<i>Item selection</i>	<i># items</i>	<i>alpha</i>
<u>Attitude</u> towards being self-employed	Group discussion (n=10)	Pilot study (n=30)	4	0.72
<u>Personality traits:</u>				
Willingness to take risks	Hisrich and Peters 1995	Pilot study (n=29)	4	0.68
Need for independence	Hisrich and Peters 1995	Pilot study (n=21)	3	0.59
Locus of control	Hisrich and Peters 1995	Pilot study (n=29)	3	0.64

The questionnaire was first designed in German and then carefully translated into English by native speakers. A re-translation into German (which we compared to the source text) by other bilingual people revealed that the translation had worked very well and that its wording had similar connotations. Although this gives us confidence in the equivalence of the instruments used, we can not completely rule out differences in connotations. In interpreting our findings, we therefore concentrated on large differences and avoided over-interpreting small (albeit significant) differences. The clear pattern of most results facilitated this approach.

The questionnaire was pre-tested with the students at the two German-speaking universities as well as the target population at MIT's Sloan School of Management, and it proved to be comprehensible after minor changes.

3.3. Sample

The data was compiled in the departments of business administration at three different universities: Ludwig Maximilian University in Munich and the Vienna University of Economics and Business Administration, both of which were compared with Sloan School of Management (MIT). As mentioned in the introduction, MIT is one of the highest-rated business schools worldwide and is also known for its tremendous success in new venture creation (Ayers 1997; Roberts 1991). Both German-speaking schools are large public universities (Munich has approximately 3,500 BA students, Vienna has approximately 15,000) and can be regarded as a typical academic institutions in their respective countries. In Munich, an entrepreneurship center was founded in 1999, and a similar center was founded in Vienna in 2001. Both centers are relatively small, and due to their size and their relatively new status they are not yet likely to have an important impact. It is important to note that although it seems reasonable that the entrepreneurial situation in these two institutions is similar to that in other universities in Germany, Austria and Switzerland, the results are (strictly speaking) only valid for the two universities involved and can not be generalized beyond them.

We drew random samples in all three universities and received a highly satisfactory overall response rate of more than 70% (Table 2). It must be admitted, however, that the response rate was not equal in all three sub-samples, although all respondents enjoyed comparable

participation incentives (a raffle with PDAs and textbooks as prizes). From our perspective, there are two major reasons for this: First, questionnaires were physically distributed and filled out during classes in Munich and Vienna, while we had to send out an electronic questionnaire via the official mailing list at MIT. Response rates are generally reported to be lower for electronic questionnaires (Bachmann et al. 2000; Mehta and Sivadas 1995). Second, MIT students are probably under much more time pressure than students in Munich and Vienna, thus the opportunity costs of filling out the questionnaire are higher. In-depth comparisons with external data, however, revealed no obvious bias in the MIT sample.

Table 2:

Samples

<i>University</i>	<i>Form</i>	<i>Selection</i>	<i>Sample size</i>	<i>Responses</i>	<i>Response rate</i>
Munich	Paper questionnaire	Random (cluster sample)	342	312	91.2 %
Vienna	Paper questionnaire	Random (cluster sample)	481	468	97.3 %
MIT	Electronic questionnaire	Random	490	148	30.0 %
Total			1,313	928	70.7 %

4. Findings

4.1. Entrepreneurial Intentions among Students

The importance of intentions as an antecedent of planned behavior (such as founding a company) has been emphasized in recent years (Krueger, Reilly and Carsrud 2000). As it has been shown that intentions are the best predictor of actual behavior, we took this variable as a dependent measure and investigated students' entrepreneurial intentions in Munich, Vienna and MIT.

In general, our findings indicate that at MIT students' entrepreneurial intentions are stronger and more ambitious in terms of business growth. This reflects the expectations which led to this benchmarking study. The results presented in this section can therefore be considered a validation rather than a new conclusion.

If we first look at the proportions of students who intend to start a business after graduation, we can find significant differences (Table 3). Every fifth student at MIT states that it is "very likely" that s/he will start a business after graduation, and an additional third at least thinks that it is "likely". In Munich and Vienna, the percentage of students who are very certain about starting a business after graduation is clearly lower. The percentage of students who show a positive tendency toward self-employment but are not completely certain is also lower, although the difference between the Vienna and MIT samples is small.

Table 3:

Intention to Start a Business after Graduation

<i>University</i>	<i>Very likely</i> [%]	<i>Likely</i> [%]	<i>Unlikely</i> [%]	<i>Very unlikely</i> [%]	<i>n</i>	<i>Mean (Std. dev.)</i>
Munich	6.1	19.3	59.0	15.6	295	2.84 (.75)
Vienna	7.8	28.4	45.6	18.1	408	2.74 (.84)
MIT	19.0	30.6	35.4	15.0	147	2.46 (.97)

ANOVA: $F = 10.087$ (2 df among 847 within groups), $p < 0.001$

Post-hoc (Tamhane test): Munich – MIT: $p < 0.001$; Munich – Vienna n.s.; Vienna – MIT: $p < 0.001$

The pattern of differences between Munich and Vienna students and the benchmark of MIT students becomes clearer when we take a closer look at the characteristics of their startup plans (Tables 4 and 5). The difference does not become obvious in comparisons of team orientation, planned team size and expected time between graduation and business startup. There are no significant differences between the three samples. However, the plans of MIT students are obviously more ambitious than the plans of their German-speaking counterparts. The growth intentions in the MIT sample are five times higher. This difference becomes even greater if we compare the means (which are more sensible for outliers) instead of the medians.

Of course, growth *intentions* must not be confused with realized growth. Not all students with strong entrepreneurial intentions will actually found their own businesses, and it is obviously very difficult to foresee the success of a task which has not even been started. Thus, the precise and absolute numbers are not the important issue. What matters more is the difference between the two German-speaking universities and MIT. Research has argued that the entrepreneurs' intentions will have an impact on their actual performance (Bird 1988, Cooper 1993, Davidsson 1991, Herron and Robinson, Kolvereid 1992, and Sexton 1989). Hence the enormous differences in the students' startup plans will almost surely lead to major differences in new venture performance.

Table 4:

Process Characteristics of Students' Startup Plans

<i>University</i>	<i>Team startup intended?</i>	<i>Team size [median]</i>	<i>Time after graduation [median]</i>	<i>Growth intentions (employees 3 yrs. after founding) [median]</i>
Munich (1)	71.2 % yes	3	5 years	10
Vienna (2)	77.3 % yes	3	5 years	10
MIT (3)	86.3 % yes	4	5 years	50
Δ (1) – (2)	n.s. ¹	n.s. ³	n.s. ³	n.s. ³
Δ (1) – (3)	n.s. ¹	n.s. ³	n.s. ³	P<0.05 ³
Δ (2) – (3)	n.s. ¹	n.s. ³	n.s. ³	P<0.05 ³
total	n.s. ¹	n.s. ²	n.s. ²	p<0.001 ² [F=9.743]

¹ Chi-square test; ² ANOVA; ³ Tamhane test

The more significant economic impact of the MIT students' planned startups is also reflected in the industries targeted. A large fraction of the MIT respondents inclined toward entrepreneurship would like to start high-tech companies, either in Internet-related business (15%) or other high-tech fields such as biotech, communication or information technologies (27%), which does not even include the large fraction of students who were undecided at that point. In Munich and Vienna, the respective numbers are significantly lower; most students plan startups in consulting, professional services, and other fields, which are usually associated with a lower level of economic impact compared to high-tech growth opportunities.

Table 5:

Industries Targeted by Students' Startup Plans

<i>University</i>	<i>Internet [%]</i>	<i>Other high-tech [%]</i>	<i>Other [%]</i>	<i>Undecided [%]</i>
Munich (1)	7	9	80	4
Vienna (2)	13	2	84	1
MIT (3)	15	27	24	34

Chi-square test: Munich – MIT: p<0.001; Munich – Vienna p<0.01; Vienna – MIT: p<0.001; total p<0.001

In order to control for a “technology” bias of MIT business students we asked n=114 engineering students of the Technical University of Munich to report their plans regarding self-employment after graduation. Not surprisingly, plans of engineering students interested in becoming self-employed are more favorable towards technology (most planned software services). The level of entrepreneurial intention and the likely economic impact of the planned start-ups, however, are very similar to the results in the population of German-speaking business students reported so far: A mean intention of 2.87 (.64) and a growth

ambition of 10 employees three years after founding (median) again reflects a considerable difference to MIT students.

In summary, MIT students' intentions to found new businesses are stronger, more ambitious and directed to a greater extent toward high-tech areas than the plans of their counterparts in Munich and Vienna.

4.2. Possible Explanations

In the following sections, we will empirically analyze several possible explanations for the MIT students' stronger entrepreneurial intentions by comparing the samples with respect to different variables which are generally assumed to have an impact on entrepreneurial intentions. We have to emphasize, however, that these comparisons must not be confused with tests of causality. Rather, the objective is to develop hypotheses from our results.

4.2.1. Personality Traits

In this section, we will review the first possible explanation: personality traits. For this purpose, we selected three different personality traits often associated with entrepreneurship: "willingness to take risks", "need for independence", and "locus of control". These constructs have been mentioned frequently as part of the "personality" of new venture creators (Brockhaus and Horwitz 1986; Shaver and Scott 1991; Lumpkin and Erdogan 1999; Bonnett and Fuhrmann 1991).¹ We then tested whether the samples displayed different levels in these variables (Table 6).

¹ Regression analyses confirm the relationships: between the willingness to take risks (independent variable) and the intention to become an entrepreneur (dependent variable) there is a strong linear (positive) relationship with $R^2 = 0.066$ (adj. $R^2 = .065$), $p < 0.001$ ($F = 60.3$ $df = 848$). A similar result is obtained for the need for independence ($R^2 = 0.046$ (adj. $R^2 = .043$), $p < 0.001$ ($F = 21.0$ $df = 440$) and for the locus of control $R^2 = 0.009$ (adj. $R^2 = .008$), $p < 0.01$ ($F = 7.5$ $df = 848$). In a simultaneous multiple regression the need for independence fails to have an independent impact, probably due to the relatively high correlations among the traits.

Table 6:

Personality Traits

<i>University</i>	<i>Willingness to take risks</i> ⁵			<i>Need for independence</i> ⁶			<i>Locus of control</i> ⁷		
	Mean	Std. dev.	n	Mean	Std. dev.	n	Mean	Std. dev.	n
(1) Munich	3.41	0.69	311	3.93	0.59	311	3.59	0.61	311
(2) Vienna	3.40	0.75	466	3.87	0.62	466	-	-	-
(3) MIT	3.62	0.78	147	3.63	0.64	147	3.74	0.65	147
$\Delta(1) - (2)$ ¹		n.s.			n.s.			- ⁴	
$\Delta(1) - (3)$ ¹		p<0.05			p<0.001			p<0.05 ³	
$\Delta(2) - (3)$ ¹		p<0.05			p<0.001			- ⁴	
total ²		p<0.01 [F=5.249]			P<0.001 [F=11.749]			P<0.01 [F=5.249]	
MIT students are more willing to take risks			... have a lower need for independence			... have a stronger internal locus of control		

¹ Tamhane test; ² ANOVA; ³ t-test

⁴ For technical reasons, we did not pose this question to Vienna students

⁵ Additive index of four items (1 = very low willingness to take risks, 5 = very high willingness to take risks)

⁶ Additive index of three items (1 = very low need for independence, 5 = very high need for independence)

⁷ Additive index of three items (1 = external locus of control, 5 = internal locus of control)

The analysis of personality traits yields a somewhat mixed pattern. On the one hand, MIT students have a significantly higher willingness to take risks and a stronger internal locus of control than the Munich and Vienna samples. At first glance, this would allow us to hypothesize that different levels of entrepreneurial intentions can – at least in part – be attributed to the different personalities of the students. On the other hand, the findings also show that MIT students display a significantly *lower* need for independence than their counterparts at German-speaking universities, which in turn weakens this line of argumentation. In addition, it must be considered that although the differences in "willingness to take risks" and "locus of control" are statistically significant, they are far from being impressive. It seems not justified to attribute the huge differences in entrepreneurial intentions to one fifth or one seventh of a scale unit on a five-point rating scale.

4.2.2. Attitude toward Self-Employment

We know from attitude theory that attitudes usually impact intended behavior to a certain extent (Ajzen & Madden 1986; Ajzen & Fishbein 1980). In the context of our study, it seems plausible (and the data confirms this assertion as well) that the more students value the

entrepreneurial career path, the stronger their intentions are to become entrepreneurs themselves.²

If we compare the attitudes of the students from the three samples, we find an astonishing result (Table 7): MIT students' attitude towards self-employment is by no means more positive than those of Munich students – it is even significantly less favorable. The proposition that a more favorable attitude toward being self-employed leads to a higher level of entrepreneurial intention among MIT students can obviously be ruled out. The value students attribute to this career path is even higher in Munich than at MIT.

Table 7:

Attitudes toward Self-Employment

<i>University</i>	<i>Mean attitude²</i>	<i>Standard deviation</i>	<i>n</i>	<i>MIT students ...</i>
Munich	3.01	0.64	310	
Vienna	- ¹	- ¹	- ¹	
MIT	3.15	0.66	143	... have a less positive attitude toward self-employment

¹ For technical reasons, we did not pose this question to Vienna students

² Additive index of four items (1 = very positive attitude, 5 = very negative attitude)

T-test: Munich – MIT: $p < 0.05$

4.2.3. Environmental Factors

In economic terms, the intention to start a business basically involves an economic assessment in which students compare the expected costs and benefits of a career as an entrepreneur. One important determinant of the outcome of this equation is the environment. Environmental factors can facilitate or impede entrepreneurial activities and thus affect the perceived cost/benefit ratio of new venture creation. They may also play an important role when it comes to forming entrepreneurial intentions among students. Thus they were included in this survey. In addition, it seems promising to explore these factors, as they are levers of policy – be it at government or university level – and can therefore be changed in cases where doing so seems promising.

The comparison between Munich and MIT students (Table 8) shows dramatic differences in the perception of environmental factors related to entrepreneurship. In all ten variables, MIT students perceived their environment as more favorable, with six of the ten variables showing significant differences. Specifically striking are the discrepancies with regard to the perception of governmental policy (service support and state laws) and the different image of the entrepreneur in society, where the difference in means is nearly 0.7 scale units – this is

² A regression analysis shows that in our sample between the attitude towards self-employment (independent variable) and the intention to become an entrepreneur (dependent variable) there is a strong linear (positive) relationship with $R^2 = 0.150$ (adj. $R^2 = .148$), $p < 0.001$ ($F = 76.7$ $df = 434$).

considerable on a five-point scale. In addition, the impact of the universities is rated very differently, an aspect which we will discuss in more detail in the next section. In total, this means that MIT students perceive their environment as more helpful than their German-speaking counterparts do. We therefore hypothesize that these perceived environmental factors might be responsible for the huge differences in entrepreneurial intentions among the samples.

Table 8:
Perception of Environmental Factors

Perception of environmental factors ²	<i>Munich</i> ¹		<i>MIT</i>		<i>p</i>	<i>MIT students perceive environment as ...</i>
	Mean	Std. dev.	Mean	Std. dev.		
<i>Market</i>						
"Startups face immediately high competitive pressures"	2.09	0.76	2.28	0.98	<0.05	... more favorable
"It is hard to find a business idea for a business that hasn't been realized before"	2.56	1.02	2.67	1.21	n.s.	... more favorable
<i>Financing</i>						
"It is easy to obtain venture capital"	3.51	0.72	3.39	0.98	n.s.	... more favorable
"Banks do not readily give credit to start up companies"	2.27	0.83	2.65	1.00	<0.001	... more favorable
<i>Government policy</i>						
"There are sufficient subsidies available for new companies"	2.91	0.77	2.86	0.90	n.s.	... more favorable
"Qualified consultant and service support for new companies is available"	3.02	0.75	2.36	0.88	<0.001	... more favorable
"The bureaucratic procedures for founding a new company are unclear"	2.43	0.82	2.53	0.88	n.s.	... more favorable
"State laws (rules and regulations) are adverse to running a company"	2.64	0.85	3.33	0.92	<0.001	... more favorable
<i>Society</i>						
"Entrepreneurs have a positive image with the society"	2.55	0.81	1.85	0.90	<0.001	... more favorable
<i>University</i>						
"The course work at the ... university prepares you well for self-employment"	3.36	0.88	2.53	0.92	<0.001	... more favorable

¹ For technical reasons, we did not pose this question to Vienna students.
² Rating scales (1 = very accurate, 5 = not accurate at all)
T-test: Munich – MIT: p<0.05

4.2.4. The University as a Specific Environmental Factor

The academic context is an important part of the students' environment, as universities are in a position to shape and encourage entrepreneurial intentions. Even more significantly, as much as they can foster entrepreneurial spirit among their graduates, universities can also dampen optimism and may even convert students who were originally interested in entrepreneurship into graduates interested only in a career at large and established companies. (In Section 2, we review the literature on this "transformation" effect.) Consequently, the three universities' specific activities to foster the inclination toward starting new businesses could probably serve as an explanation for the international differences in students' entrepreneurial intentions.

Respondents were asked to rate various aspects of entrepreneurial education and support.³ As the last part of Table 8 already indicates, there are huge differences in the way universities foster entrepreneurship – at least from the point of view of their students. Table 9 reveals that the differences between Munich and Vienna are relatively small, but that both German-speaking universities can in no way keep up with MIT as a benchmark. The differences are all significant and far clearer than the differences with respect to personality traits, attitudes and other contextual factors.

Table 9:

Perception of the University Environment

Perception of the university environment ²	<i>Munich</i>		<i>Vienna</i>		<i>MIT</i>		<i>P</i> ¹	<i>MIT students perceive their university as ...</i>
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.		
<i>Initiation</i>								
"The creative atmosphere inspires us to develop ideas for new businesses"	3.78	0.81	3.68	0.92	1.85	0.89	<0.001	... more favorable
<i>Development</i>								
"The courses foster the social and leadership skills needed by entrepreneurs"	3.36	0.81	3.46	0.81	2.14	0.95	<0.001	... more favorable
"The courses provide students with the knowledge required to start a new company"	3.31	0.80	3.26	0.92	2.18	0.96	<0.001	... more favorable
"My university supports building multi-disciplinary student teams"	3.44	0.95	2.89	0.96	2.41	0.90	<0.001	... more favorable
<i>Active support</i>								
"The university actively promotes the process of founding a new company"	3.39	0.98	3.16	1.06	2.50	1.06	<0.001	... more favorable

³ Of course the list of measures and programs a university may carry out to foster entrepreneurship can be amended, e.g. by level of industry-institute interaction or faculty input during courses.

"The university provides a strong network of new venture investors"	3.58	0.99	3.04	1.06	2.73	1.14	<0.001	... more favorable
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¹ ANOVA, differences between MIT and Munich and Vienna are not displayed but are highly significant

² Rating scales (1 = very accurate, 5 = not accurate at all)

The most striking discrepancy is related to the *initiation* of entrepreneurial spirit by establishing a creative and supportive atmosphere for idea generation. Whereas this factor is the best-rated in the MIT sample, it is the worst-rated in both the Munich and Vienna samples. The difference is almost two scale units on a 5-point rating scale. The stimulation of entrepreneurship may be based on a number of elements in the educational program, such as exposing the students to role models in entrepreneurship as well as to frontier technologies and ground-breaking ideas. The US business school seems to be better prepared to instill entrepreneurial spirit than the German-speaking universities and, by this, to initiate the entrepreneurial decision process among their students.

There are also major differences in the evaluation of *development* measures. The students at MIT believe to a greater extent than the students from Munich and Vienna that their lectures promote skills and knowledge which are critical for future entrepreneurs. In a similar vein, Sloan School of Management seems to support the interaction of students from various disciplines more effectively (science, engineering, management). This can also be interpreted as an important development activity. After all, multi-disciplinary new venture teams are more likely to make adequate decisions in the founding process (Roberts 1991, Roure and Maidique 1986).

Finally, the US business school is perceived to be more active in *supporting* future entrepreneurs in the pre-creation stage. As a part of this support for the establishment of new ventures, the Sloan School of Management is apparently involved in the creation of networks, particularly by making connections with potential technology, funding, and marketing partners. The two student samples in Munich and Vienna perceive the overall support and the specific programs to nurture essential business contacts to be less established.

In sum, findings suggest that the huge differences in entrepreneurial intentions among the samples might be attributed to environmental factors – in this case to the specific factor of entrepreneurial education and support at the university level.

5. Discussion

5.1. Reviving Sleeping Beauties

The objective of this study was to analyze the starting position of typical German speaking universities with regard to entrepreneurship and entrepreneurial intentions among students. For this purpose, we compared the entrepreneurial intentions of Munich and Vienna students with intentions of students at a highly ranked benchmark business school: MIT's Sloan School

of Management. We also explored several factors that are possibly associated with this intention.

We found that entrepreneurial intentions among Munich and Vienna students are lower than among their counterparts at MIT. Approximately one third of the students in the German-speaking sample intended to start a company after graduation. This percentage is much higher (nearly 50%) in the MIT sample. The difference becomes even clearer when focusing exclusively on the students who claim to be very certain about becoming self-employed. Moreover, the intentions of students interested in becoming entrepreneurs are clearly less ambitious in Munich and Vienna compared to the plans of the US students. This is reflected in the fact that the projected number of employees indicated by Sloan students is five times higher than that indicated by students at the German-speaking universities. In addition, the targeted industries in Vienna and Munich are – in clear contrast to those targeted by MIT students – predominantly services, while innovative technology-based markets are rarely taken into consideration. The lower inclination to base the new business on technology and new product development outlines the necessity to foster cooperation of management students with technical trained students and faculty. Management students may be encouraged and enabled to exploit innovative technologies or a new product possibilities. After all, a key expectation underlying the programs and activities to foster entrepreneurship is that of creating high-growth new ventures in dynamic and innovative markets.

The observed differences are hardly surprising, as they primarily confirm the expectations we drew from the universities' differing track records in entrepreneurship – which was actually the reason we chose MIT as a benchmark. Rather, we are astonished that the difference in the percentage of students who plan to become entrepreneurs is not greater. We cautiously conclude that, with some effort, it should be possible to significantly increase the economic effects of graduates' entrepreneurial activities in German-speaking countries.

This hypothesis receives some support by the analysis of factors explaining entrepreneurial intentions. We found that the personality traits often associated with entrepreneurship are similarly distributed in all three samples – MIT students have a slightly higher willingness to take risks and a somewhat stronger internal locus of control (that is, they believe that they control their environment and not vice versa), but at the same time they show a lower need for independence. Overall, personality predispositions do not seem to explain the differences in entrepreneurial intentions. Even more surprisingly, the attitude toward self-employment is even *more favorable* among German-speaking students than among the respondents in the US sample. These findings leave us with a puzzle: How can the huge differences in entrepreneurial intentions be explained if the pertinent personality traits and attitudes barely differ?

One possible answer to this question is provided by an analysis of the environment. Both the macro environment (i.e., markets, capital markets, and governmental policy) and the micro environment (i.e., the university with its tasks of initiating, developing and supporting entrepreneurship inspiring, training, actively supporting, and networking students), which are crucial for new venture creation, are rated much more favorably by MIT students than by the students in Vienna and Munich. Seemingly, these activities of initiation, development and

support somehow "trigger" the intentions of students to become entrepreneurs and prompt them toward more ambitious startup plans.

On the basis of this interpretation, we conjecture that it might be possible for German-speaking universities to instill a similar entrepreneurial propensity in their students by organizing the entrepreneurship-related environment more positively. For universities in particular, this means that they can foster confidence in new venture creation by establishing entrepreneurship centers and by focusing their courses more on the creation of new enterprises than on the management of existing ones. Specific activities could include, for example, using positive role models in teaching, intensifying experimental learning and real-world experience with regard to critical issues in the startup process, and establishing support networks with sponsors and coaches. Our results give some confidence that such endeavors will bear fruit, and that the "sleeping beauty" of graduates' entrepreneurial activities can indeed be revived.

5.2. Validity of the Interpretation

It has to be noted that our interpretation of the findings might be affected by the fact that the implicit reference points (or standards) of the respondents with regard to the entrepreneurial context differ across the samples. Specifically, the divergent perception of entrepreneurial activities at the universities might be mainly due to different ideas of a "satisfactory" level of university support. Usually a respondent will derive her/his evaluation by comparing the actual situation with the desired conditions. Thus, the point of reference plays an important role in assessment. If it varied systematically between the German-speaking samples and the American sample, the results would not be directly comparable. We do not think, however, that this would contradict our results regarding the role of universities in fostering entrepreneurial intentions. Logical consideration suggests that the reference points of MIT students are probably, if at all different, more demanding than the reference points of the Munich or Vienna students, that is, the respondents at MIT have higher expectations and are more easily dissatisfied. After all, MIT students pay very high tuition fees (tuition for the 2002-2003 MBA program is \$32,470), and students will naturally demand a corresponding level of performance and service in return. MIT has a worldwide reputation for delivering high quality in research and teaching, and it sets high standards that will, in turn, lead to high reference points. Tuition fees are rather low at the public universities of Vienna and Munich (approx. \$600 a year in Vienna, even less in Munich) due to differing governmental policies which subsidize university studies. For numerous reasons (which are not at issue here), both universities will induce lower expectations than MIT as a top business school. We therefore conclude that the actual difference in fostering entrepreneurship between the German-speaking universities and MIT is even *underestimated* by directly asking the respective students, thus our comparison is very conservative.

Another issue is *selection bias* as students at the different institutions naturally are of different qualification level. MIT as one of leading business schools has an acceptance rate of only 10-15% of all applicants (businessweek.com) while German-speaking universities are not allowed to select their students. This selection bias might have an impact on the ambition of

students regarding entrepreneurship and be an alternative (or additional) explanation of the differences found.

In order to assess this bias, we asked students at MIT if the reputation of the entrepreneurship center had impacted their decision to go to MIT. The astonishing result is that 53.8% of respondents indicated that the entrepreneurship center had “not at all” impacted their decision with a mean answer of 4.0 (1.31) on a 5-point scale (1=very much, 5=not at all). Thus it seems that our basic interpretation is somehow justified: Regarding entrepreneurship, MIT excels primarily at stimulating students, not at selecting them.

5.3. Some Reflection on Causality

Our discussion of the practical implications of this study builds on a straightforward line of argumentation: We observe different levels in the dependent variable (students' entrepreneurial intentions) at the three universities and look for differences in other variables where we have reason to believe they might affect this dependent variable. We attribute the differences in the dependent variable to the independent one where the differences are greatest – the environmental factors, specifically the universities themselves as micro-environment. In a nutshell, we infer causality where we only observe a correlative relationship. As in all such studies, we cannot rule out the possibility that we have omitted (relevant) independent variables. It would certainly be overly rash to attribute the huge differences in the entrepreneurial intentions of students *solely* to the environment and particularly to the universities. It is very plausible, however, that the different levels of entrepreneurial culture in the three universities are at least partly responsible for the differences in entrepreneurial activity after graduation. Future studies involving longitudinal data and many more objects (i.e., universities) might test our hypothesis about the general impact of environmental factors and the specific effect of a supportive university context on the intention to found new businesses.

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