Gender Differences in Competitiveness, Risk Tolerance, and other Personality Traits: Do they contribute to the Gender Gap in Entrepreneurship?

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Abstract This study empirically investigates whether personality traits that can be matched to the tasks of entrepreneurs predispose men and women to entrepreneurship and whether gender differences in these personality traits contribute to the gender gap in entrepreneurship. Using data obtained from a recent large scale survey of individuals in 36 countries, we find that men's and women's preference for being self-employed (*latent entrepreneurship*) and the decision to take steps to start new businesses (*nascent entrepreneurship*) are positively related to *competitiveness, risk tolerance,* and six other task matched personality traits. Moreover, our results point to a strong *joint effect*, since particularly individuals scoring very high on almost all analyzed personality traits are more likely to be latent and nascent entrepreneurs. The results of a decomposition analysis suggest that gender differences in task matched personality traits contribute significantly to the gender gap in latent and nascent entrepreneurship. Particularly gender differences in competitiveness tend to be relevant.

Keywords: *entrepreneurship, gender gap, personality traits, competitiveness*
JEL-Classification: J16, L26, D03

1. Introduction

There is ample empirical evidence for a gender gap in entrepreneurship. A higher proportion of men engage in entrepreneurial activities as compared to women and this does not only apply to developing but also to developed economies (Klapper and Parker 2010; Estrin and Mickiewicz 2009).[1] Men are more likely to have a preference for self-employment (Verheul et al. 2011), they are more likely to be engaged in the creation of new businesses (Delmar and Davidsson 2000; Langowitz and Minniti 2007), and women are outnumbered by men in established business ownership (Allen et al. 2008). In recent years female entrepreneurship has attracted a considerable amount of attention in academic research and many governments have taken measures to support it (Carter and Ó Cinnéide 2007, OECD 2004). However, the reasons for the gender gap in entrepreneurship are still not fully understood.

Empirical research suggests that gender differences in psychological characteristics may contribute to the gender gap in entrepreneurship. Verheul et al. (2011), for instance, find that the relatively low risk tolerance of women makes them less willing to become self-employed. However, their results point to an indirect relationship between self-employment and risk tolerance. They find that risk tolerance is important only for individual preference for being self-employed which in turn positively affects actual involvement. With respect to other psychological characteristics empirical results are less clear-cut. The findings reported by Verheul et al (2011) suggest that women's weaker internal locus of control does not seem to affect their involvement in self-employment. Moreover, optimism seems to have a significant influence on male and female entrepreneurship especially in the early stages of the entrepreneurial process (van der Zwan et al. 2011).

This paper contributes to the literature by empirically investigating the contribution of gender differences in *competitiveness* to the gender gap in entrepreneurship. We make use of a recent dataset comprising information about competitiveness of men and women in 36 countries (Flash Eurobarometer *Entrepreneurship* 2009). The effects of competitiveness on individual decision to become self-employed have been largely ignored in previous empirical research.[2] This is startling, since already Schumpeter (1934) identified competitiveness as one of the major motivations for entrepreneurship. Bartling et al. (2009, p.93) state that "competition is a cornerstone of economic life" as individuals are often confronted with the decision to self-select into a competitive environment or to shy away from it and occupational choice is an important example for such a decision. We argue that gender differences in competitiveness may be an important determinant for the gender gap in entrepreneurship. The results of recent empirical studies – which do not focus on entrepreneurship – suggest that men are more competitively inclined than women (Croson and Gneezy 2009). Niederle and Vesterlund (2007, p.1067) conclude that "women shy away from competition and men embrace it".

Moreover, this paper contributes to the literature as we do not solely focus on competitiveness in our empirical analysis but also take into account a group of personality traits that can be matched to tasks of entrepreneurs, i.e.

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[1] Although there is a considerable cross-country variation in female as well as male self-employment rates (Reynolds et al 2004, Bosma and Harding 2007; Crowling 2000) and the number of self-employed women has increased notably (Devine 1994 for the US), self-employed women are still outnumbered by self-employed men.
[2] Competitive aggressiveness is an important dimension of Entrepreneurial Orientation construct introduced by Covin and Slevin (1989). However, empirical studies on EO focus on the firm-level, whereas our study strictly focuses on the individual level.

autonomy, general self-efficacy, innovativeness, internal locus of control, optimism, proactiveness, and *risk tolerance*. Following Rauch and Frese (2007), we argue that particularly personality traits that can be matched to the task of running a business predispose men and women to entrepreneurship. Results of meta-analytic research point to a small, positive relation between new business creation and *autonomy*, *internal locus of control*, and *risk-taking propensity* and a positive, moderate relation between new business creation and *innovativeness* and *self-efficacy* but the relevance of task matched personality traits might has been underestimated in past research (Hisrich et al. 2007, p.580).

We argue that previous empirical studies may have underestimated the relevance of personality because these studies usually examined the relationship between entrepreneurship and single personality traits, which means that they measure the *partial effects* of such personality traits. It can be argued, however, that especially individuals scoring high on a number of task matched personality traits are more likely to be predisposed to entrepreneurship than individuals scoring high on only one single personality trait. We therefore analyze the *joint effect* of task matched personality traits. To do so, we compute an index of summed scores of the task matched personality traits which we call *Individual Entrepreneurial Aptitude (IEA)*.

Furthermore, the focus of our empirical analysis is on *latent* and *nascent entrepreneurship* which can be viewed as the earliest stage of the entrepreneurial process.[3] Consequently, we do *not* analyze the relationship between entrepreneurial *success* and personality traits, since this would address a different research question.[4] We exclude all individuals with any experience in self-employment from our empirical analysis of latent entrepreneurship and all individuals who are currently self-employed from our analysis of nascent entrepreneurship to avoid that our measure of task matched personality traits are affected by entrepreneurial success or failure (reverse causality). By distinguishing between *latent* and *nascent entrepreneurship* we are also able to investigate whether tasked matched personality traits merely influence the general desire to be self-employed or whether they also directly affect the decision to take steps to start a new business.[5]

Finally, we make use of a decomposition technique which allows us to measure the relative contributions of personality traits and other control variables to the gender gap in latent and nascent entrepreneurship. While decomposition techniques were already employed in previous studies on the gender gap in entrepreneurship (Leoni and Falk 2010, Furdas and Kohn 2010), these studies do not examine the role of competitiveness and other task matched traits and they do not focus on latent and nascent entrepreneurship but analyze the decision to become self-employed *ex post*.

What this study does not at all address are the determinants of gender differences in task matched personality traits. These differences might be the result of *nature*, e.g. genes or hormones (Nicolaou and Shane 2009; Guiso and Rustichini 2011; Buser 2011) or they exist due to *nurture,* e.g. socialization and role models (Gneezy et al. 2009,

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[3] Individuals who prefer being self-employed are called *latent* entrepreneurs (Blanchflower et al. 2001, Gohmann 2010), while individuals who are actually taking steps to start a business are called *nascent* entrepreneurs (Davidsson, 2006).
[4] A related strand of empirical research compares male to female entrepreneurs, where the female self-employed or business owners are compared to their male counterpart with respect to their individual psychological and non-psychological characteristics (see e.g. Sexton and Bowman-Upton 1990; Birley 1989, Cromie1987).
[5] In a similar way Verheul et al. (2011) treat the entrepreneurial process as a two-step procedure and differentiate between the cognitive stage of 'wanting it' and the behavioral stage of 'doing it'.

Niederle et al. 2010; Balafoutas and Sutter 2010). However, examining the factors determining task matched personality traits is beyond the scope of this study. Moreover, we make use of the notion of *personality traits* instead of *psychological characteristics* or *personality characteristics* to be in line with previous research referring to *traits*. We do by no means insinuate, however, that task matched personality traits are innate and immutable.[6] Furthermore, we acknowledge that not only competitiveness and the other task matched personality traits may be relevant for entrepreneurship but also higher order personality trait dimensions (e.g. the Big Five (see e.g. Costa and McCrae 1992). Recent meta-analyses find a significant correlation between broad personality traits and entrepreneurial behavior (Zhao and Seibert 2006, Zhao et al. 2010) and based on panel data Caliendo et al. (2011) find that the Big Five personality factors significantly influence the decision to start a business. In order to avoid misconceptions, we follow Rauch and Frese (2007) and call the personality traits analyzed in our study *task matched* personality traits.

Our empirical analysis is based on the "Flash Eurobarometer *Entrepreneurship* 2009" which is a general population survey conducted at the request of the Directorate General (DG) "Enterprise and Industry" of the European Commission. In December 2009 and January 2010 people in 32 European countries plus China, Japan, South Korea, and the US were surveyed. In all countries the data are representative of the entire population (over 15 years of age). DG "Enterprise and Industry" kindly allowed us to include items measuring task matched personality traits (e.g. competitiveness). Furthermore, the dataset contains information about interviewees' preferences for being self-employed (latent entrepreneurship), start-up activities (nascent entrepreneurship), and personal characteristics, e.g. age, education or occupational status.

The results of our empirical analyses suggest that latent and nascent entrepreneurship are positively related to competitiveness, risk tolerance, and other task matched traits. Estimation results further point to a strong joint effect of the analyzed task matched traits, where the probability of having a preference for self-employment and the probability of being engaged in business creation increases significantly if an individual scores high on all or almost all task matched personality traits analyzed in this paper. The estimated effects are not only statistically significant but their magnitude is also remarkable. The results of a decomposition analysis suggest that particularly gender differences in competitiveness and risk tolerance contribute significantly to the gender gap in latent and nascent entrepreneurship.

The remainder of our study proceeds as follows. Section 2 explains the conceptual framework of our study and derives hypotheses. Section 3 describes the empirical approach, the data source, and the measurement of variables. Descriptive statistics are presented in Section 4. The econometric specification and estimation results of our study are discussed in Section 5. Section 6 concludes.

2. Conceptual Framework and Hypotheses Development

In order to explain how task matched personality traits may affect men's and women's decision to engage in business creation activities, we make use of a simple occupational choice model. For the sake of simplicity, we

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[6] There is a debate whether personality traits are fixed and immutable (see Roberts 2006 for a discussion). However, our empirical analysis is not based on this assumption, since we simply argue that an individual's current levels of task matched personality traits influence her or his current preference for self-employment and current start-up activities.

assume that individuals can only choose between two occupations: they can switch to self-employment or they may remain in their current (occupational) status. Furthermore, we follow Gimeno et al. (1997) and Gohmann (2010) and assume that the decision to switch from one occupation to another is negatively related to the *costs inherent in switching*. Individuals who want to switch to self-employment have to take into account the cost of starting a new business (Blanchflower et al. 2001).

Assume that an individual remaining in his or her current (occupational) status *(j)* has an *expected* utility of U_j. Alternatively the individual can switch from the current (occupational) status to self-employment *(s)* which yields the *expected* utility U_s. Woman *(f)* and men *(m)* decide to switch from current (occupational) status to self-employment and become *nascent entrepreneurs* if the following conditions hold:

$$U_s^m - U_j^m > SC_{js}^m \tag{1a}$$

$$U_s^f - U_j^f > SC_{js}^f \tag{1b}$$

Men and women tend two take steps to start a new business if the expected utility in self-employment (U_s) minus the expected utility of remaining in the current (occupational) status (U_j) exceeds the cost inherent in switching from the current occupation to self-employment (SC_{js}).

According to this simple occupational choice model men will be more likely than women to switch from their current status to self-employment if the following condition holds:

$$U_s^m - U_j^m - SC_{js}^m > U_s^f - U_j^f - SC_{js}^f \iff (U_s^m - U_j^m) - (U_s^f - U_j^f) > SC_{js}^m - SC_{js}^f \tag{2}$$

Hence, there are to explanations for a gender gap in *nascent entrepreneurship*. On the one hand, a gender gap in business creation activities may exist because women may face higher switching cost than men: $SC_{js}^m < SC_{js}^f$. For instance, switching cost may be relatively high for women because of institutional barriers, like access to finance and social norms, which may hinder their engagement in entrepreneurial activities (Klapper and Parker 2010). On the other hand, even if identical switching costs are assumed, men are more likely to start businesses than women if the difference between expected utility in self-employment and expected utility of remaining in current occupation *j* is larger for men as compared to women: $(U_s^m - U_j^m) > (U_s^f - U_j^f)$.

However, the conditions (1a) and (1b) also imply that switching cost may force men and women to remain in their current occupation even if the expected utility in self-employment is higher than the expected utility in their current occupation. According to our model women *(f)* and men *(m)* will be *latent entrepreneurs* and remain in the lower utility yielding occupation if the following conditions hold:

$$0 < U_s^m - U_j^m < SC_{js}^m \tag{3a}$$

$$0 < U_s^f - U_j^f < SC_{js}^f \tag{3b}$$

For *latent entrepreneurs* the difference between the expected utilities in self-employment and their current occupation is positive but it does *not* exceed switching cost. This may explain why many employed men and women in the industrialized countries are *latent entrepreneurs*, i.e. they state that they would rather prefer to be self-

employed than being employee if they could choose but do never actually start a business (Blanchflower et al. 2001). Hence, men tend to be more likely to be *latent entrepreneurs* (having a preference for being self-employed) than women if men assess the expected utility in self-employment relatively higher than women.

Our main hypothesis that the gender gap in latent and nascent entrepreneurship is due to gender differences in task matched personality traits is based on two propositions: First, the expected utility in self-employment is positively related to task matched personality traits. Second, men and women differ with respect to the *level* of these personality traits.

However, our first proposition has to be specified because latent and nascent entrepreneurship are determined by the *difference* between expected utility in self-employment and the expected utility in the current occupation. Therefore, we argue that the difference between expected utility in self-employment (U_s) and the expected utility of remaining in current occupation (U_j) is increasing in the level of task matched personality traits. This would imply that self-employment tends to be more attractive for men and women ranking high in task matched personality traits as compared to individuals ranking low in these traits. Variation in psychological characteristics may also explain why some latent entrepreneurs take steps to start a business while others do not. Especially latent entrepreneurs with a very high level of task matched personality traits tend to become nascent entrepreneurs because for these individuals the expected utility from self-employment is very high and therefore it is more likely that the difference between the expected utility in self-employment and the expected utility of remaining in current occupation exceeds switching cost. In contrast, latent entrepreneurs with relatively lower levels of task match personality traits may remain in the lower utility yielding occupation because the difference between utilities is still lower than switching cost. According to our second proposition women may score lower in relevant psychological characteristics than men and might therefore be less likely to be latent and nascent entrepreneurs.

In order to justify our first proposition, it is essential to provide an explanation for the link between expected utility in self-employment and task matched personality traits. To do so, we refer to the concept of 'procedural utility' which "refers to the value that individuals place not only on outcomes, as usually assumed in economics, but also on the process and conditions leading to outcomes" (Benz and Frey 2008b, p. 363). Empirical evidence suggests that self-employed are more satisfied with their work than people employed in firms or other organizations (Benz and Frey 2008a, b, Blanchflower 2000, Hundley 2000) and this finding may be explained by procedural utility (Benz and Frey 2008b). In other words self-employed are more satisfied with their work, because they do what they like.[7]

We argue that men and women ranking high on task matched personality traits might prefer self-employment to wage employment and may switch from wage employment to self-employment because of a higher *expected* procedural utility in self-employment as compared to wage employment. Psychological research emphasizes the role of person-environment interaction, where a fit can be observed between the individual's psychological characteristics and the characteristics of the work environment (Kristof-Brown et al. 2005). Zhao et al. (2010, p.384)

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[7] Of course, job satisfaction is not only determined by *non-monetary* benefits but also by *monetary* benefits of self-employment. Results of empirical studies suggest, however, that self-employment offers significant non-monetary benefits, whereas Hamilton (2000) provides empirical evidence that monetary benefits themselves seem to be relatively low.

"expect individuals to be attracted to entrepreneurship based on the self-perceived match between their own personality traits and the task demands of entrepreneurship".

Against this background, we hypothesize that competitiveness, risk tolerance and other task matched personality traits may predispose men and women to latent entrepreneurship and nascent entrepreneurship and that gender differences in these psychological characteristics contribute to the gender gap in latent and nascent entrepreneurship.

Competitiveness

Competitiveness is the general willingness to enter competitive situations and we expect that the procedural utility in self-employment is higher for men and women with a competitive spirit than for men and women who shy away from competition. In general, environment tends to be more competitive in self-employment as compared to other occupations.[8] For instance, "a self-employed lawyer is in constant competition for clients, whereas a lawyer working as a civil servant in a public authority is not" (Bartling et al. 2009, p.93). The relevance of competitiveness as major motivation for individual engagement in entrepreneurship was already stressed by Schumpeter (1934, p. 93), who states that "there is the will to conquer; the impulse to fight, to prove oneself superior to others, to succeed for the sake, not for the fruit of success, but of success itself". Accordingly we argue that individuals who are competitively inclined have a higher probability of being *latent* entrepreneurs, since it is more likely that the expected (procedural) utility in self-employment exceeds expected (procedural) utility of in their current occupational status (see Conditions 3a and 3b). Furthermore, it is more likely that competitively inclined individuals are *nascent* entrepreneurs since it is more likely for them that the difference between the expected utilities in self-employment and current occupation exceeds the cost inherent in switching to self-employment (see Conditions 1a and 1b). This leads to our first two hypotheses:

> HYPOTHESIS 1a: *Latent entrepreneurship is positively related to competitiveness.*
> HYPOTHESIS 1b: *Nascent entrepreneurship is positively related to competitiveness.*

Reviewing the literature on gender differences in economic experiments Croson and Gneezy (2009) identify robust differences in competitive preferences. They conclude "that women's preferences for competitive situations are lower than men's, both in purely competitive situations and in bargaining settings" (Croson and Gneezy 2009, p.21). Analyzing the self-selection of women and men into competition versus into a non-competitive alternative Niederle and Vesterlund (2007) find that 73% of the male participants in their experiment select themselves into a competitive situation where the female rate was no more than 35%. The authors stress that this difference cannot be explained by performance, but by differences in the *preference* for competition.[9] Analyzing the behavior of men and women in TV game shows Hogarth et al (2011) find that women quit voluntarily competitive games more often as compared to men and that voluntary withdrawals by women rise if the proportion of female to male competitors

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[8] Of course, environment is not always more competitive in self-employment than in wage employment. For instance, top-managers may face fierce competition and empirical evidence suggests that competitiveness is also a key personality trait possessed by successful salespeople (Wang and Netemeyer 2002).

[9] Other studies show that men also improve their performance under competitive situations as compared to the non-competitive alternative (e.g. Gneezy et al. 2003), especially in intergroup competition, while such an effect cannot be observed for women (Van Vugt et al. 2007).

decreases. The results of an experimental study by Shurchkov (2011) suggest that women are significantly less likely to compete when task stereotypes and time constraints are present and choose competition more often if both sources of pressure a removed.

Other studies focus on samples consisting of children to reduce the influence of parental role models, education and culture, (Sutter and Rützler 2010, Gneezy and Rustichini 2004) and confirm a gender difference in competitiveness prevailing already at young age. Sutter and Rützler (2010) designed an experiment of a running competition, based on a sample of children between three and eight years old from Austrian Kindergartens and elementary schools. The children had to decide if they run on their own or if they prefer running against another coequal child of their age-group. Across all age-groups, they found girls to be about 15% less willing to join competition as compared to boys. Moreover, this gender difference in competitiveness is reported for three to four years old children. The authors conclude that the gender difference in competitiveness occurs very early in life.

Gender differences in competitiveness may be explained by *nature* (Nicolaou and Shane 2009; Guiso and Rustichini 2011; Buser 2011), *nurture* (Balafoutas and Sutter 2010, Gneezy et al. 2009), or *both*. Recent studies on competitiveness refer to evolutionary or sociobiological theories (Van Vugt et al. 2007, Gneezy and Rustichini 2004) and examine the importance of cultural conditions for the competitive behavior of men and women (e.g. Gneezy et al. 2009). Booth and Nolan (2011, 2009) find that girls' levels of competitiveness and risk tolerance depend on the presence of boys and their results show that girls from single sex schools are as competitive as boys which may point to the relevance of "nuture".

Taken together, the results of empirical studies and economic experiments suggest that generally women are less competitively inclined than men. Nature and nurture may be responsible for the gender difference in competitiveness but we do *not* analyze possible reasons for this gender difference (see Croson and Gneezy 2009 for a discussion). Instead, we focus on the gender gap in entrepreneurship and argue that women's lower level of competitiveness contributes to the gender gap in latent and nascent entrepreneurship. Women will be less likely to self-select in occupations characterized by a competitive environment if they are less competitively inclined than men which leads to the following hypotheses:

> *HYPOTHESIS 1c: Gender differences in competitiveness contribute to the gender gap in latent entrepreneurship*
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> *HYPOTHESIS 1d: Gender differences in competitiveness contribute to the gender gap in nascent entrepreneurship*

Risk tolerance

In theoretical studies provided by entrepreneurship reserach, risk tolerance is usually viewed as a crucial determinant for entrepreneurial activities, since individuals with a higher tolerance for risk are more willing to bear risks associated with the entry into self-employment (Kihlstrom and Laffont 1979, Knight 1921). While a number of empirical studies question this relationship (e.g. Cramer et al. 2002), recent empirical studies tend to confirm that the probability of becoming an entrepreneur are positively related to risk tolerance and negatively related to risk-

aversion (Caliendo et al. 2009, Kan and Tsai 2006).[10] Against this background, we expect that *risk tolerance* positively affects particularly the expected *procedural utility in self-employment*. For instance, procedural utility in self-employment tends to exceed procedural utility in wage employment if an individual is risk tolerant whereas men and women who are risk-averse tend to assess expected procedural utility in self-employment as low. Accounting again for the relevance of switching costs, which may cause individuals to stay in wage work although they have a preference for self-employment, we can postulate our second hypothesis:

> *HYPOTHESIS 2a: Latent entrepreneurship is positively related to risk tolerance.*
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> *HYPOTHESIS 2b: Nascent entrepreneurship is positively related to risk tolerance.*

The literature review by Croson and Gneezy (2009) points to robust gender differences in risk preferences. Croson and Gneezy (2009, p. 4) "find that women are more risk averse than men in lab settings as well as in investment decisions in the field." Although most empirical studies find that women are more risk averse than men, some studies report other findings. For example, Kogan and Dorros (1978) find men to exceed the risk taking propensity of women significantly only in courses of competitive play and therefore suggest a link between a competitive spirit and risk taking propensity. However, inconsistent results can often be explained by artificial settings, which tend to underestimate the gender differences in risk tolerance as compared in real life situations (Ronay and Kim 2006). Based on a meta-analysis of 150 studies, comprising different data collection methods (self-reports, hypothetical choices and observed behavior), Byrnes et al. (1999) conclude that men have a higher risk tolerance as compared to women. Hence, we argue that a lower level of competitiveness contributes to the gender gap in latent and nascent entrepreneurship.

> *HYPOTHESIS 2c: Gender differences in risk tolerance contribute to the gender gap in latent entrepreneurship*
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> *HYPOTHESIS 2d: Gender differences in risk tolerance contribute to the gender gap in nascent entrepreneurship*

Individual Entrepreneurial Aptitude

While competitiveness and risk tolerance will predispose men and women to entrepreneurship if expected utility in self-employment is positively related to them, it is likely that other task matched personality traits exist which may also be related to expected utility in self-employment. Rauch and Frese (2007) argue that especially those personality traits that can be matched to the tasks of running a business are relevant for individual decision to start a business. According to Rauch and Frese (2007) a*utonomy, innovativeness, proactiveness, general self-efficacy*, and internal *locus of control* are personality traits that match personality with work characteristics of entrepreneurs.[11] Hence, besides competitiveness and risk tolerance traits may be relevant for latent entrepreneurship and nascent entrepreneurship. We argue that these personality traits tend to have a positive effect on the expected

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[10] However, empirical results reported by Caliendo et al (2009) also suggest that unemployed and inactive people differ from employed people with respect to the influence of risk tolerance.

[11] Rauch and Frese (2007, p. 369-370) state that internal locus of control, risk taking, innovativeness, proactive personality, and generalized self-efficacy "are important predictors of entrepreneurial behavior". However, the results of their meta-analysis suggest that the effect sizes of internal locus of control and risk taking are relatively small.

procedural utility in self-employment and that this effect is stronger than a potentially positive effect on procedural utility in wage-employment. *Autonomy*, which is closely related to independence, captures the "desire for freedom to control one's own affairs" (Brandstätter 1997, p.164). Of course, it is also possible that individuals may prefer to engage in entrepreneurial activities *within* existing organizations because of the expected gains associated with these activities. However, the procedural utility from entrepreneurial activities within existing organizations tends to be lower, because "employed persons are subject to the institution of hierarchy" whereas self-employed are their own bosses (Benz and Frey 2008a, p.453). Therefore, we expect the difference between the expected utility in self- and wage employment to rise with the level of an individual's striving for autonomy. *Innovativeness* is a basic concept of the Schumpeterian entrepreneur (Schumpeter 1934) and associated with the tendency to search for new ideas and ways of action. Innovative people tend to have more and better opportunities to develop their new and probably unconventional ideas as compared to employees, since the latter are often restricted by already existing routines or established processes and incumbent firms may not have a strong incentive to replace existing products with new ones. Hence, highly inventive people may perceive a higher procedural utility when being self-employed. *Proactive* personalities are likely to be prone to entrepreneurial activities as they recognize opportunities and take action on them (Crant 1996). A proactive individual, who has the "relative stable tendency to affect environmental change" (Bateman and Crant 1993, p.103) is therefore more likely to perceive higher non-monetary benefits from business creation as compared to wage work, as a start-up activities allow for acting on the need to actively shape the environment. A high *internal locus of control* (Rotter 1966) should increase the procedural utility in self-employment relative to wage work as individuals highly internally controlled are likely to prefer work environments that enable them to exert dominating influence on business activities. Self-employment provides a work environment that offers individuals the opportunity to relate their outcomes more closely to their own actions not to powerful other or to chance. *General self-efficacy*, in contrast to *specific* self-efficacy, differentiates individuals in their beliefs in their own capability to perform in a variety of achievement situations (Chen, et al., 2001). It can be expected that individuals who are more confident of the general efficacy of *internal* sources of success (*general self-efficacy*) and not of *external* sources of success (*general external efficacy*) perceive a higher expected utility from self-employment as compared to wage work (Urbig et al. 2011). Individuals high on general self-efficacy are confident to cope even with difficult tasks. These individuals are more likely to exploit *entrepreneurial* opportunities as they are convinced that they can cope with problems associated with starting a new business (Bandura 1997, Chen et al 2001) without the help of powerful others or luck. Finally, *general optimism* may influence the decision to exploit discovered opportunities since more optimistic people may generally perceive the chances of success higher than people who are less optimistic (Shane and Venkataraman 2000). On the one hand, one might argue that optimistic people tend to see a favorable trend, irrespective whether there are employees or self-employed people. On the other hand, self employment is more strongly characterized by uncertainty associated with unforeseen contingencies than wage work. Hence, individuals who are *not* optimistic may value procedural utility in self-employment lower as compared to wage work.

Since especially procedural utility in self-employment is positively related to each of the task matched personality traits, it can be expected that the difference between expected utilities in self- and wage employment is larger for individuals ranking high on all tasks matched personality traits. In particular, it can be argued that not a single personality trait but a configuration of personality traits predicts entrepreneurial behavior of men and women (Mueller and Thomas 2001). Consequently, we do not only examine the *partial* influence of competitiveness, risk tolerance, and other task matched personality traits but additionally analyze the *joint effect* of *competitiveness, risk tolerance, autonomy, innovativeness, proactiveness, general self-efficacy*, *general optimism* and *internal locus of control*. We call this group of traits *Individual Entrepreneurial Aptitude (IEA)* and argue that individuals who rank high on *IEA* are more likely to have a general preference for being self-employed (*latent entrepreneurship*) and are also more likely to take steps to start a business (*nascent entrepreneurship*). For instance, an individual may rank high on only one task matched trait, e.g. innovativeness, but ranks low on all other traits. For this individual the probability of being a latent entrepreneur can be expected to be lower as compared to an individual who is not only ranking high on innovativeness but also ranking high on other task matched traits. Accordingly, individuals ranking high on all or almost all task matched traits have ceteris paribus the highest probability of being latent or nascent entrepreneurs. Hence, we derive the following hypotheses with respect to the relationship between entrepreneurship and *Individual Entrepreneurial Aptitude (IEA)*.

> *HYPOTHESIS 3a: Latent entrepreneurship is positively related to Individual Entrepreneurial Aptitude (IEA).*
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> *HYPOTHESIS 3b: Nascent entrepreneurship is positively related to Individual Entrepreneurial Aptitude (IEA).*

Further, we hypothesize that gender difference in *IEA* may contribute to the gender gap in latent and nascent entrepreneurship. However, in contrast to competitiveness and risk tolerance, empirical evidence for gender differences in other personality characteristics that are considered as relevant for entrepreneurial behavior is scarce. For instance, Wilson et al. (2007) find that women lack behind men in their level of *self-efficacy*. Concerning the gender difference in *locus of control* findings are ambiguous, as men are predominantly suggested to be more internally controlled as compared to women which holds across different domains, but there is also a considerable number of empirical studies which do not find a significant gender difference in locus of control (Sherman et al. 1997, Feingold 1994). Since we expect that all task matched characteristics are positive related to expected utility in self-employment we hypothesize that gender differences in IEA may contribute to the gender gap in entrepreneurship.

> *HYPOTHESIS 3c: Gender differences in IEA contribute to the gender gap in latent entrepreneurship*
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> *HYPOTHESIS 3d: Gender differences in IEA contribute to the gender gap in nascent entrepreneurship*

3. Method

3.1 Data source

Individual data are obtained from the Flash Eurobarometer *Entrepreneurship* 2009 (Flash EB *Entrepreneurship*). This general population survey was conducted by *EOS Gallup Europe* in 36 countries at the end of 2009 as a telephone interview. For each country a random sample of 500 or 1000 individuals was generated, representative on the national level for the population aged fifteen years and above. Approximately 26.000 people were surveyed. The Flash EB *Entrepreneurship* 2009 and previous waves of this survey have already been used in other empirical studies (e.g. Gohmann 2010, Grilo and Thurik 2005, Grilo and Thurik 2008, Verheul et al. 2011, van der Zwan et al 2011).[12]

3.2 Variables

Dependent Variables

Latent entrepreneurship: The Flash EB *Entrepreneurship* comprises information about individual preference for being self-employed. The interviewees declare whether they would prefer – if they could choose – "*being an employee*" or "*being self-employed*". In line with previous empirical studies we use a dummy variable as an indicator for *latent entrepreneurship* that takes the value one if interviewees state that they prefer being self-employed and is zero otherwise (Blanchflower et al. 2001). This dummy variable is not fully consistent with our occupational choice model because interviewees do not declare whether they would prefer to remain in their current occupation. However, at least for interviewees who are employees this indicator can be interpreted in this way.

Nascent entrepreneurship: The Flash EB *Entrepreneurship* contains a filter question which asks whether respondents have ever started a business or are taking steps to start one. Those who answer this question with 'yes' are asked to choose between five statements that best describes their situation. One statement refers to current start-up activities while the other statements refer to past start-up activities. We construct a dummy variable that takes the value one if the respondent is *currently taking steps to start a business* and zero otherwise. We call individuals reporting such early stage start-up activities nascent entrepreneurs. Measuring nascent entrepreneurship by self-reported current start-up activities is common practice and used, for example, in the Global Entrepreneurship Monitor (GEM) or the Panel Study of Entrepreneurial Dynamics (PSED).

Task matched Personality Traits

DG "Enterprise and Industry" kindly allowed us to include statements measuring personality traits that can be matched to the tasks of entrepreneurs. However, in order to increase the expected response rate and to keep the costs of the survey down, we agreed to keep the list of questions (statements) as short as possible and included only *eight* statements each of them measuring a different task matched personality trait, i.e. *competitiveness*, *risk tolerance,* and six other personality traits (*autonomy, innovativeness, proactiveness, general self-efficacy, general optimism,* and

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[12] More information about the method of the survey can be obtained from the *Analytical Report* of the Flash EB *Entrepreneurship* 2009: (http://ec.europa.eu/enterprise/policies/sme/facts-figuresanalysis/eurobarometer/fl283_en.pdf).

internal locus of control).[13] Moreover, all item-scales were adjusted to the methodology of the Flash EB *Entrepreneurship*, which means that each item is measured a 4-point scale where interviewees had to state if they *strongly agree, agree, disagree* or *strongly disagree* with the respective statement.

Measuring each of the task matched personality traits by one single item is certainly a shortcoming as we cannot check the validity of the measurement model by applying internal consistency assessments (e.g. Cronbach's alpha). While it would be preferable to measure each of these traits by a multi-item scale, there is a trade-off between the accuracy of measurement and sample size. Using comprehensive scales usually results in small non-representative samples while large representative samples usually do not allow for exact measurement. Therefore, single item measurement finds its support in literature on measurement instruments. Robins et al. (2001) emphasize the advantage of single item measures in large scale surveys, like the Flash EB *Entrepreneurship*, where time constraints limit the number of items which can be administrated. In practice, "researchers may be faced with a stark choice of using an extremely brief instrument or using no instrument at all" (Gosling et al. 2003).

We selected the eight items according to the following criteria: First, we referred to validated scales, predominantly provided by psychological research and include – when possible – items already tested in an entrepreneurial context. Second, we selected items measuring task matched traits as *general* personality traits (not context-specific). Hence, items should reflect super-ordinate constructs that should be stable across different domains (see e.g. Judge et al. 1998 for general self-efficacy and Dohmen et al. 2011 for risk tolerance) to avoid biased measurement by familiarity with the respective domain.[14] Third, the statements had to be plain for everyone, independent of social and educational background or work experience because the Flash EB *Entrepreneurship* was addressed to the general population. Fourth, simplicity of items was advantageous for the translation of statements into the various languages, administrated by the EOS Gallup Group.[15]

Competitiveness: In order to measure competitiveness of men and women we included an item reflecting the *general* attitude towards competitive situations: *I like situations in which I compete with others.* The indicator for *competitiveness* is a dummy variable that takes the value one if the respondent agrees or strongly agrees with this statement and is zero otherwise (disagree or strongly disagree).

Our measure of competitiveness is an indicator for a *general* affinity to situations which are characterized by competition. It refers to the work and family orientation questionnaire (WOFO) by Helmreich and Spence (1978), who suggest competitiveness as a dimension of achievement motivation.[16] Carsrud et al. (1989) relate competitiveness as a dimension of the multi-dimensional need for achievement motive to entrepreneurial success. While competitiveness has not received much attention in research on entrepreneurship, competitiveness as a personality trait has been studied by Houston et al. (1992), Smither and Houston (1992), and Houston 2002.

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[13] Although it is very likely that other personality traits are also relevant for latent and nascent entrepreneurship, it was not possible to take into account more task matched personality traits or higher order personality trait dimensions (e.g. the Big Five).

[14] In our study we refer to general personality trait measures provided by psychological research. Hisrich et al (2007, p.575) suggest personality measurement scales exclusively developed for entrepreneurs to be "of limited value" and researchers should make use of "established measures from mainstream personality psychology". However, scale development and item design are controversially discussed in literature on entrepreneurship and personality traits.

[15] In addition, we also conducted a pilot study based on a sample of students of economics at the University of Wuppertal. In this study we used multi-item scales to measure each of the task matched personality traits. The estimation results show that the single items implemented in the Flash Eurobarometer Entrepreneurship 2009 perform well.

[16] Helmreich and Spence (1978) report that factor analysis produced similar factors for men and women.

***Risk tolerance*:** We measure risk tolerance as the *general* willingness to take risks. The indicator for risk tolerance is a dummy variable that takes the value one if the respondent agrees or strongly agrees with the statement "*In general, I am willing to take risks*", and is zero otherwise (disagree or strongly disagree).[17]

Our measure of general risk tolerance is an indicator for a trait-like attitude which is independent from situational contexts (Mullins and Forlani 2005) and is supposed to be 'super-ordinate to more domain-specific risk attitudes' (Ronay and Kim 2006, p.399). It has been experimentally validated by Dohmen et al. (2011) who examine the measurement of risk attitudes using questions asking people about their *general* willingness to take risks and questions about risk attitudes in specific contexts, such as car driving, financial matters or sports. They present empirical evidence suggesting that the general measure of risk tolerance is an appropriate all-round predictor of risky behavior. This single item measure has been already applied in studies on nascent entrepreneurship (Caliendo et al. 2009) and in labor market studies (e.g. Bonin 2007).

Other task matched personality traits: In order to control for the influence of *autonomy, innovativeness, proactiveness, general self-efficacy, general optimism,* and *internal locus of control,* we make use of items already tested in an entrepreneurial context or refer to relevant scales provided by psychological research (see Table 1). When examining the effects of competitiveness and risk tolerance, we control for these six personality traits by including a dummy variable. We compute a dummy variable that is set to 1, if the average sum of scores assigned to the six items is at least equal to 3.

Individual Entrepreneurial Aptitude (IEA): In order to examine the *joint effect* of the *eight* task matched personality traits, we compute the summed index of the eight personality traits. Since theoretical considerations do not allow us to draw conclusions on the relative importance of certain personality traits, the index is computed as the *un*weighted sum of scores of all indicators.[18] As all items are positively directed, we can interpret the *IEA*-Index in the way that the higher the summed score the higher the *Individual Entrepreneurial Aptitude*.

This *IEA*-Index ranges between the value 8 at minimum and 32 at maximum. In order to test a non-linear relationship between the level of *IEA* and entrepreneurship, we do not include the *IEA-Index* as continuous variable into regression analyses, but divide the measure into five categories: an *IEA* score of *8 to 20, 21 to 23, 24 to 26, 27 to 29* and *30 to 32*.

Insert Table 1: Items measuring the relevant task match personality traits that form Individual Entrepreneurial Aptitude (IEA) here

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Control Variables

Income satisfaction (opportunity cost): Theoretical considerations point to the relevance of opportunity cost, i.e. utility in wage employment. We argue that opportunity costs of switching from wage employment to self-

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[17] Previous empirical studies using data obtained from Flash EB *Entrepreneurship* measured risk tolerance by the following statement: ''One should not start a business if there is a risk it might fail'' (e.g. Grilo and Thurik 2008, van der Zwan et al. 2011; Verheul et al. 2011).

[18] Building a summed index is accompanied with some problems as it implicitly adds more weight to highly correlated indicators (Covin and Wales 2011, p. 10, Wilcox et al. 2008, p. 1022) and leads to a loss of information if items are uncorrelated (Howell et al. 2007). This should be less of a concern with our *IEA* measure since the correlation coefficients between all eight items range from 0.15 to 0.32 and are statistically significant. Hence, items are neither strongly correlated nor completely uncorrelated. This suggests that each item measures another personality trait.

employment are high if an individual is very satisfied with current household income and are low if an individual is dissatisfied with the current income. The Flash EB *Entrepreneurship* does not provide any information about the absolute annual income, but about the interviewee's feelings about the household income, ranging from *"live comfortable on the present income"* to finding it *"very hard to manage on the present income"*. The answer provides information about the "value of money" which differs between individuals (van Praag 1985). A further advantage of this measure is that the respondent is not asked to assess his or her satisfaction with personal income but with *household* income, which means that incomes of other family members and family size are taken into account.

Social status of entrepreneurs: We control for the perceived social status of entrepreneurs since societal values may influence individuals' desire to engage in entrepreneurial activities (de Bruin et al. 2007). We measure the relative social status assigned to entrepreneurs by the respondent relative to the social status assigned to other proposed occupational groups. Thus, the higher the computed value, the higher the respondent values entrepreneurs compared to the other proposed occupational groups on average.

Obstacles to entrepreneurial activity: Based on a survey of the extant literature on the relationship between gender and entrepreneurship, Klapper and Parker (2010) conclude that the gender gap in entrepreneurship cannot be explained by explicit discrimination in laws and regulations but can in part be explained by business environment factors. In particular the limited access of women to external finance may inhibit business creation, since external financing is an important factor for the creation of new ventures. We therefore control for several burdens that might hinder entrepreneurial activity of men and women. These burdens are the lack of information about how to start a business, lack of financial support, and administrative burdens. The latter two obstacles are proposed to be determinants of entrepreneurship by Grilo and Thurik (2005, 2008). Each obstacle is measured by a binary variable that is set to 1 if the respondent strongly agrees with the statement that it is difficult to start a business because of the respective obstacle, and is zero otherwise.

Further Controls: We control for *age* by a set of dummy variables and for *education* by age when finished fulltime education as well as for *parental self-employment*, supposed to influence self-employment preference and entrepreneurial activity. Parental self-employment is proxied by a dummy-variable that is set to one, if at least one parent is self-employed, otherwise the value is set to zero. In addition, a set of dummy variables for *occupation* is included, because entrepreneurial activities are more likely to be observed for some occupations in comparison to others (Evans & Leighton 1989). Therefore data is broken down to professions within occupational subgroups. Further, dummy variables for the *area* (metropolitan, urban or rural zone) and *country* where the respondent lives are included in order to control for country-specific effects, such as culture, political system and economic conditions.

The definitions of all variables can be found in Table A 1 in the Appendix and summary statistics of all variables are reported in Table A 2 in the Appendix.

3.3 Samples used in empirical analyses

In our empirical analyses we make use of different samples. The maximum number of observations for which we have complete information about interviewees' assessment of all eight statements measuring task matched personality traits is 22554 (12927 (57%) women and 9627 (43%) men).[19] The descriptive statistics concerning task matched personality traits which we present in the next section are based on this sample. This large sample allows us to present descriptive statistics of task matched personality traits for the total sample and to present the results of tests for gender differences separately for each of the 36 countries.

However, the number of observations which we use in our econometric analyses is lower for several reasons. First, we focus on the employable population at the age of 15 to 64 years, excluding students and retirees. Second, we have to exclude observations due of missing values for relevant variables (including a number of control variables) and because of plausibility checks. Third, we exclude all self-employed individuals to avoid endogeneity problems. Our empirical analysis of the relationship between *nascent* entrepreneurship and task matched personality traits is based on a sample of 8176 individuals (59% women, 41% men). The number of observations used for the analysis of the relationship between *latent* entrepreneurship and task matched personality traits is 6559 (62% women, 38% men). This number is smaller because we additionally exclude all individuals with entrepreneurial experience, i.e. individuals who state that they have ever started a business in the past or are currently taking steps to start a business. Fourth, we analyze sub-samples to check the robustness of our estimation results, i.e. sub-sample of women, men, and employees.

4. Descriptive Statistics

To set the scene, we report the gender differences in the eight single task matched personality traits and the gender difference in the sum of scores of all eight traits (*IEA-Index*). Figure 1 shows for each task matched personality trait the fraction of men and women who *strongly agree* with the statement measuring the respective personality trait. Both, men and women, tend to score very high on some task matched traits whereas the fraction of top scorers is relatively low for other traits. For example, 34.95% of men and 33.21% of women strongly agree with the statement measuring internal locus of control whereas only 18% of men and 14% of women strongly agree with the statement measuring risk tolerance. However, for each of the eight personality traits the fraction of top scorers is lower for women as compared to men. In particular, women and men differ with respect to risk tolerance and competiteveness. Only 11.84% of women strongly agree with the statement measuring competitiveness while 19.50% of men agree with it. This finding confirms previous research pointing to gender differences in competitiveness.

Insert Figure 1: Share of Top-Scorers in Competitiveness, Risk Tolerance and the other six Personality Traits here

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[19] The total Flash EB *Entrepreneurship* 2009 sample (26168 observations) consists of 15239 women (58%) and 10929 men (42%).

Figure 2 shows the distributions of the *IEA-Index*, divided into 5 categories. The figure illustrates the share of women and men having a sum of scores of the personality traits within the respective *IEA* category. The majority of individuals has an *IEA* score from 21 to 26. Only a small fraction of individuals in our sample belongs to the group of top scores (*IEA* score of 30 to 32) which may corroborate Schumpeter (1934) who states that entrepreneurial aptitude is present in only a small fraction of the population. The average *IEA* score of women is lower than the average *IEA* score of men. As compared to men, women are overrepresented in the lower *IEA* score categories and underrepresented in the higher *IEA* score categories.

Insert Figure 2: Distribution of IEA scores of Women and Men here

Next we test whether the gender differences in task matched personality traits are statistically significant. Since it could be argued that gender differences might be related to culture or that the same items may not necessarily measure the same characteristics in differing countries, we do not only report the results of tests based on the total sample but also report test results separately for each country. To do so, we compute for each country gender-specific average scores for each personality trait and in addition the average scores of *IEA*. Table 2 reports the differences in means for each country of our sample and the difference in means for member states of the EU15 and EU27 and for the full set of 36 countries. As can be seen from the table, the main gender differences can be observed for *competitiveness* and *risk tolerance*. Women's average scores of competitiveness are lower than average scores of men in all 36 countries and the differences are statistically significant in 32 countries. Risk tolerance of women is also lower than risk tolerance of men in the majority of countries. Concerning the other personality traits women still tend to score lower as compared to men, but differences are often small and in many cases they do not turn out to be statistically significant. Moreover, we find women and men to differ significantly in their level of *IEA* in 26 of 36 countries (at least at the 5% level), whereby the average scores of the female population are persistently lower than the average scores of men.

Since we measure *IEA* by creating a *summed index* from the scores of its eight components, gender differences in *IEA* differences can be explained by the contributions of the gender differences in the single personality traits forming *IEA*. Here, the descriptive statistics point to the special relevance of competitiveness and risk tolerance for gender differences in *IEA*. Concerning the values reported for the total sample as well as for the member states of the EU27 and the EU15, about 40% of the gender differences in *IEA* are due to gender differences in competitiveness. If one adds gender differences in risk tolerance, about 60% of the differences are due to differences in competitiveness and risk tolerance. Nevertheless, the other traits measuring *IEA* are also important, as they jointly capture about 40% of the difference in *IEA* between women and men.

Insert Table 2: Differences between Men and Women in Average Scores of IEA and Single Personality Traits here.

5. Econometric Specification and Estimation Results

5.1 Econometric Specification

According to our simple occupational choice model outlined in Section 2, an individual who is not already self-employed will prefer being self-employed if the expected utility in self-employment exceeds the expected utility in the current occupation. The individual will actually take steps to start a business if this difference between expected utilities exceeds the costs inherent in switching to self-employment. Hence, latent and nascent entrepreneurship are related to utilities which are *unobserved*. However, following a standard approach in empirical research we assume an additive random utility model, where utilities have a deterministic component and a random component (see e.g. Cameron and Trivedi 2005, p.476f). Furthermore, we argue that the difference between the deterministic components of utilities depend on personality traits that can be matched to the tasks of entrepreneurs. Based on these assumptions we make use of binary probit models to estimate the influence of personality traits on the probability of being a latent and/or a nascent entrepreneur. The binary dependent variable measuring latent entrepreneurship takes the value 1 if an individual prefers being self-employed and is zero otherwise. The dependent variable measuring nascent entrepreneurship takes the value 1 if an individual is currently taking steps to start a business and is zero otherwise. We include a set of age dummy variables, education, a dummy for parental self-employment, social status of entrepreneurs, dummy variables for income satisfaction, a set of occupation dummy variables, and a set of country dummies, which control for country-specific fixed effects. When examining the relationship between nascent entrepreneurship and task matched personality traits, we also control for obstacles to start-up activities which may increase the costs inherent in switching to self-employment.

In order to quantify the contribution of *task matched personality traits* to the gender gap in entrepreneurship and to test our Hypotheses 1c, 1d, 2c, 2d, 3c, and 3d, we make use of the Blinder-Oaxaca decomposition technique which has been extended by Fairlie (2005) to logit and probit models. This allows us to decompose the gender gap in the average value of the dependent variable *Y* into the *coefficients effect* and the *characteristics effect*:

$$Y_{im} - Y_{if} = \underbrace{\left[\hat{P}(\beta_{ip}, X_{im}) - \hat{P}(\beta_{ip}, X_{if}) \right]}_{characteristics-effect} + \underbrace{\left[\hat{P}(\beta_{im}, X_{im}) - \hat{P}(\beta_{ip}, X_{im}) \right] + \left[\hat{P}(\beta_{ip}, X_{if}) - \hat{P}(\beta_{if}, X_{if}) \right]}_{coefficients\ effect} \qquad (4)$$

where i is an index representing latent and nascent entrepreneurship, $Y_{im} - Y_{if}$ represents the gender gap in latent (nascent) entrepreneurship and $\hat{P}$ represents the average predicted probabilities of latent (nascent) entrepreneurship for both genders (*m,f*). The characteristics influencing latent (nascent) entrepreneurship among men and woman are X_{im} and X_{if}. The parameters of the pooled estimations are β_{ip} and the parameters of separate estimations for men and women are: β_{im} and β_{if}. The *characteristics effect* captures the differences in the predicted probabilities due to gender differences in the distribution of characteristics, e.g. levels of *task matched personality traits*, when pooled parameter estimates are used. The *coefficients* (or residual) effect represents the part

of the gender gap in latent (nascent) entrepreneurship which is not explained by the characteristics effect and thus captures the residual part of group differences (Leoni and Falk 2010).

5.2 Latent Entrepreneurship and task matched personality traits

Estimation results are based on two samples: The first sample (Sample I) comprises individuals who are 15 to 64 years old and who are either employees or are seeking a job or are looking after the home (*employable population*); retirees and individuals in fulltime education are excluded. Sample I comprises 6559 individuals (4064 women and 2495 men), where 36% of the women and 41% of the men are latent entrepreneurs. One might argue that especially people who are looking after the home may be very different from employees. People looking after the home may not be interested in self-employment at all and may also have a low preference for being employee. Therefore, the second subsample only comprises *employees* (Sample II). Sample II comprises 4893 employees where about one third of female employees (928 women) and about 41% of male employees (882 men) are latent entrepreneurs.

In order to avoid endogeneity problems, self-employed individuals and individuals who state that they have ever started a business or are currently taking steps to start one are excluded from Sample I and Sample II. It could be argued that start-up experience may influence, for instance, an individual's level of competitiveness *and* latent entrepreneurship, and including start-up experience as an explanatory variable may also lead to biased results due to reverse causality.

Table 3 reports the estimated marginal effects of the explanatory variables on the probability of being a latent entrepreneur. We first present the results of probit estimations where the indicators for task matched personality traits are not included (regressions Ia and IIa). The estimation results show that women are less likely to prefer self-employment as compared to men. The estimated marginal effect of the gender dummy variable suggests that the probability of being a latent entrepreneur is 7.79 (employable population) and 7.94 (employees) percentage points lower for women as compared to men holding the control variables constant at their mean. Among the control variables particularly income (dis-)satisfaction seems to have an influence the preference for being self-employed. If an interviewee reports that she or he lives comfortable on the present household income, the probability of being a latent entrepreneur is significantly lower (4.04 and 6.13 percentage points) as compared to an individual reporting that she or he gets along with the present household income. In contrast the probability is significantly higher (3.04 and 4.73 percentage points) if a respondent states that it difficult or very hard to manage on the present household income. Moreover, the positive and statistically significant marginal effects of parental self-employment is in line with previous research suggesting a positive influence of parental self-employment on second generation attitudes towards self-employment (Dunn and Holtz-Eakin 2000). Social status of entrepreneurs also positively affects latent entrepreneurship. In contrast, the estimated marginal effect of education, the effects of age dummies and dummy variables for occupation are statistically insignificant in most cases. Estimation results further point to unobserved environmental effects on latent entrepreneurship, like culture or economic and political system, since country-effects fixed effects are statistically significant at the 1% level throughout all regressions.

In order to test our Hypotheses 1a and 2a derived in Section 2, we extend our model by including competitiveness and risk tolerance. Moreover, we control for the influence of the other six task matched personality traits. As can be seen from Table 3 (regressions Ib and IIb), our estimation results confirm the hypothesized positive relationship between the task matched personality traits and latent entrepreneurship. The estimated marginal effect of competitiveness is positive and statistically significant at the one percent level. The probability of being a latent entrepreneur is 3.85 percentage points higher if an employee is competitively inclined. This confirms our Hypothesis 1a. The marginal effect of risk tolerance is also positive, statistically significant, and even higher than the marginal effect of competitiveness which confirms Hypothesis 1b. The marginal effect of the indicator capturing the influence of the other six task matched personality traits is positive but only statistically significant at the ten percent level. Hence, particularly individuals who are competitively inclined and who are willing to take risks are more likely to be latent entrepreneurs.

Finally, we run separate regressions for men and women to check the robustness of our results. The results of probit estimations based on the sample of women are reported in Columns Ic and IIc in Table 3 and the results of estimations based on the sample of men are reported in Columns Id and IId. Estimation results suggest that the marginal effect of *competitiveness* on female latent entrepreneurship is positive and statistically significant. The probability of being a latent entrepreneur increases by 4.89 percentage points (Sample I) and 4.44 percentage points (Sample II) if a women is competitively inclined. This suggests that variation in competitiveness explains latent entrepreneurship among women. The partial effect of competitiveness on male latent entrepreneurship is positive but it is statistically insignificant at conventional significance levels. The marginal effect of *risk tolerance* on the probability being a latent entrepreneur turns is positive and statistically significant throughout all regressions. For instance, the probability of being a latent entrepreneur rises by about 9 percentage points if a woman is willing to take risks. Concerning the other six personality traits, estimation results provide some support for their relevance for male latent entrepreneurship but seem to be less relevant for latent entrepreneurship among women.

Insert Table 3: Determinants of Latent *Entrepreneurship: Competitiveness and Risk Tolerance – Pooled and Gender-Specific Probit Estimations here.*

So far, we have analyzed the *partial effects* of competitiveness, risk tolerance and the other six task matched personality traits. Next we analyze the *joint effect* of all eight task matched personality traits on the probability of being a latent entrepreneur (Table 4). We therefore run the same regressions as presented in Table 3 but instead of including separate indicators for competitiveness, risk tolerance and the other six task matched personality traits we now make use of a set of dummy variables each of them representing a certain level of our *IEA-Index*.

Our estimation results point to a positive relationship between latent entrepreneurship and *IEA*. The estimated marginal effects of the dummy variables reflecting different levels of *IEA* are positive and statistically significant predominantly at the 1% level. In line with our theoretical considerations, the marginal effect is increasing with the level of the *IEA-Index*. The estimated marginal effect is high for very high level of *IEA* (scores from 30 to 32) and still positive but lower for lower levels of *IEA*. For instance, results reported in Column IIc suggest that a female employee's estimated probability of being a latent entrepreneur is 24.5 percentage points higher if she scores very

high on *IEA* (scores from 30 to 32) as compared to female employees scoring very low on *IEA* (*IEA* score of 8 to 20, which is the reference category). The magnitude of this marginal effect is remarkable. In contrast, the probability of being a latent entrepreneur is only increased by 8.82 percentage points if a female employee scores high on *IEA* (IEA score 27 to 29). Hence, particularly a very high level of *IEA* seems to have a strong influence on female latent entrepreneurship. Results of estimations based on the sample of men also point to a strong and positive relationship between latent entrepreneurship and *IEA*.[20]

Finally, a comparison of the partial effects of competitiveness and risk tolerance reported in Table 3 and the joint effect of all traits (*IEA*) reported in Table 4 shows that the magnitude of the joint effect on latent entrepreneurship clearly exceeds the magnitude of the partial effects for high levels of *IEA*. Hence, the estimation results confirm our *Hypothesis 3a*.

Insert Table 4: Determinants of Latent Entrepreneurship: Joint Effect of IEA – Pooled and Gender-Specific Probit Estimations here.

5.3 Nascent Entrepreneurship and task matched personality traits

In order to test Hypotheses 1b, 2b, and 3b we conduct probit estimations where we examine the relationship between the probability of being a nascent entrepreneur and task matched personality traits. The sample consists of 8176 individuals, where 5% of the 4755 women and 8% of the 3354 men are identified as nascent entrepreneurs.[21] We include obstacles to start-up activities as additional control variables since they may influence the decision to take steps to start a business by increasing the costs inherent in switching to self-employment (see Section 2).

Table 5 reports the estimation results for three different econometric specifications. First, we estimate a model without taking into account latent entrepreneurship (Model I). Second, we control for latent entrepreneurship by including it as an explanatory variable for nascent entrepreneurship (Model II). Third we restrict the sample to those individuals who prefer being self-employed (Model III). This allows us to investigate whether competitiveness, risk tolerance and the other task matched personality traits have a direct effect on nascent entrepreneurship or whether their effect is fully mediated by latent entrepreneurship. If the estimated marginal effects of task matched personality traits are statistically significant in Model II and Model III, this suggests that these personality traits do not only affect nascent entrepreneurship through their influence on latent entrepreneurship but also directly influence the decision to take steps to start a business. Again, we conduct pooled regression (a, b) as well as gender-specific regressions for women (c) and men (d).

Estimation results for our baseline model where personality traits are not included are reported in Column Ia in Table 5. The marginal effect of the gender dummy variable is negative and statistically significant at the 1% level, women's probability of being a nascent entrepreneur is 1.89 percentage points lower as compared to men. Parental

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[20] In order to check for potential multicollinearity problems we compute variance inflation factors after OLS estimations of linear probability models. Although not reported here, the results do not suggest that multicollinearity is a severe problem.
[21] The observations used in gender-specific regressions do not add up to the number of observations used for the pooled regression because some countries had to be excluded from gender-specific regressions since certain country dummy variables perfectly predict the outcome.

self-employment and social status of entrepreneurs have positive effects on nascent entrepreneurship which confirms the findings reported for latent entrepreneurship. In contrast to latent entrepreneurship, nascent entrepreneurship does not seem to be influenced by income satisfaction. This may imply that the 'desire' for being self-employed is related to income satisfaction but income satisfaction may not have a direct influence on the actual decision to start a business. Further, our results suggest that nascent entrepreneurship is related to age and education. However, while previous research points to an inverse u-shaped relationship between age and nascent entrepreneurship, our results point to a negative relationship between age and nascent entrepreneurship. As compared to the reference group (age 36 to 45) younger are more likely to be nascent entrepreneurs and older individuals are less likely. Previous research suggests that the relationship between education and entrepreneurship is ambiguous but typically assumed to be positive (Parker 2004. p.70f and 73f). Our results point to a positive relationship between education and nascent entrepreneurship. Finally, results suggest unobserved occupation- and country-specific fixed effects are statistically significant at the 1% level.

Next, we include thee indicators for competitiveness, risk tolerance, and the other six task matched personality traits (Column Ib). The marginal effects of these variables are positive and statistically significant at the 1% level. For instance, the probability of being a nascent entrepreneur increases by 1.66 percentage points if an individual is competitively inclined and marginal effects of risk tolerance and the other six traits have a similar magnitude. This result is confirmed by gender-specific regressions based on the sample of women (Column Ic) and the sample of men (Column Id).

Columns IIa to IId report the results of estimations where latent entrepreneurship is included as an explanatory variable. Again, the marginal effects of task matched personality traits are positive and statistically significant. Only the marginal effect of risk tolerance turns out to be statistically insignificant if the sample is restricted to women (Column IIb). Columns IIIa to IIId present the results of regressions which are based on the sample of latent entrepreneurs. These estimation results confirm the findings based on Model II. Consequently, our results point to a direct link between nascent entrepreneurship and task matched personality traits. Accordingly, the effect of tasked matched personality traits is not fully mediated by latent entrepreneurship. Furthermore, after controlling for task matched personality traits, the negative marginal effect of the gender dummy variable is only weakly significant (Column IIb) and restricting the sample to latent entrepreneurs results in a statistically insignificant effect of the gender dummy variable (Column IIIb). This may indicate that the gender gap in nascent entrepreneurship is (partly) explained by the influence of personality traits.

Hence, our empirical results confirm the *Hypotheses 1b* suggesting that competitiveness is a determinant of nascent entrepreneurship. Moreover, they confirm *Hypothesis 2b* pointing to the relevance of risk tolerance at least for male entrepreneurship. Moreover, estimation results suggest that the six other task matched personality traits are a relevant determinant of nascent entrepreneurship.

Insert Table 5: Determinants of Nascent Entrepreneurship: Competitiveness and Risk Tolerance – Pooled and Gender-Specific Probit Estimations here.

In order to investigate the *joint effect* of the task matched personality traits on nascent entrepreneurship, we run the same regressions as shown in Table 5 but make use of five dummy variables reflecting different levels of the *IEA*-index. Our estimation results reported in Table 6 point to a strong impact of *IEA* on nascent entrepreneurship suggesting the probability of being a nascent entrepreneur to increase with the level of *IEA*. Female as well as male nascent entrepreneurship is significantly related to *IEA*. For instance, the results reported in Column Ib suggest that the probability of being nascent entrepreneur is 14.1 percentage points higher if an individual scores very high on *IEA* (*IEA* score of 30 to 32) as compared to an individual scoring very low on (*IEA* score of 8 to 20). The positive relationship is confirmed by results of gender-specific regressions which are based on the sample of women (Columns Ic, IIc, and IIIc) and the sample of men (Id, IId, and IIId). The magnitude of the marginal effect of a very high level of *IEA* is remarkable in gender-specific regressions based on the sample of latent entrepreneurs, where probability of being a nascent entrepreneur increases by 11.2 percentage points (Column IIIc) and by 26.6 percentage points (Column IIId).[22]

Again, in comparison with the magnitude of the partial effects of competitiveness and risk tolerance on nascent entrepreneurship reported in Table 5, the magnitude of the joint effect of all traits (*IEA*) reported in Table 6 is clearly higher for high levels of *IEA*. Hence, estimation results confirm *Hypothesis 3b*.

Insert Table 6: Determinants of Nascent Entrepreneurship: Joint Effect of IEA – Pooled and Gender-Specific Probit Estimations here.

5.4 Contribution from gender differences in task matched personality traits to the gender gap in latent and nascent entrepreneurship

In order to examine the contribution from gender differences in competitiveness, risk tolerance and other task matched personality traits to the gender gap in latent and nascent entrepreneurship, we conduct non-linear decomposition analyses.[23] These analyses are based on the same samples that are used for probit estimations presented in Table 3 and Table 5. The results of the decomposition analyses are reported in Table 7.

In the group of employable individuals 41.15 % of men are latent entrepreneurs whereas only 33.74 percent of the women are latent entrepreneurs implying a difference of 7.71 percentage points. The results for employees are very similar. The fractions of nascent entrepreneurs are much smaller. Only 8.12 percent of men and 5.19 of women are nascent entrepreneurs resulting in a difference of 2.94 percentage points. As can be expected, the fraction of nascent entrepreneurs increases to 13.91% (men) and 10.23% (women) when the sample is restricted to individuals with a preference for being self-employed (latent entrepreneurs).

The characteristics effects reported in Table 7 reflect the contribution from gender differences in all explanatory variables. Accordingly, gender differences in explanatory variables explain 16.85% of the gender gap in

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[22] In order to check for potential multicollinearity problems we again compute variance inflation factors after OLS estimations of linear probability models. Although not reported here, the results do not suggest that multicollinearity is a severe problem.

[23] Coefficient estimates obtained from the pooled sample regression are used as weights for the decomposition. Alternatively, coefficient estimates obtained from male (female) sample regressions can be used to calculate the decomposition (Fairlie 2005). Although not reported here, we also calculated decomposition using alternative weights but our results suggest that the decomposition is hardly affected by the choice of weights.

latent entrepreneurship and 15.22% if the sample is restricted to employees.[24] This total effect can be broken down into the contribution from gender differences in task matched personality traits and the contribution from gender differences in the control variables. For example, if the distribution of competitiveness would be identical for employed women and employed men, the gender gap in latent entrepreneurship would be reduced by 7.55%. Gender differences in risk tolerance explain about 9% (10%) of the gender gap in latent entrepreneurship. The contribution from gender differences in the other six personality traits is rather small and explains about 1.3% (1.7%) of the gender gap in latent entrepreneurship. In addition, we report the contribution from gender differences in the control variables which is negligible or negative (-4.15%). Hence, our results suggest that women's lower levels of competitiveness and risk tolerance contribute to the gender gap in latent entrepreneurship, whereas gender differences in control variable are not relevant or would even be in favor of latent entrepreneurship among women. This confirms *Hypotheses 1c* and *2c*.

The results of the decomposition analyses with respect to *nascent* entrepreneurship are reported in Columns 3 to 5 in Table 7. Our results suggest that the gender difference in explanatory variables contribute significantly to the gender gap in nascent entrepreneurship. The characteristics effect explains 55.15 to 75.41% of the gender gap in nascent entrepreneurship. A relevant part of this effect is due to gender differences in control variables, which explain about 30% to 57% of the gender gap in nascent entrepreneurship. Accordingly, the overall contribution from gender differences in personality traits is about 19% to 25%. The contribution from gender differences in competitiveness ranges from 10.07% to 13.9% and the gender differences in risk tolerance explain 4.86% to 7.48% of the gender gap in nascent entrepreneurship. The contribution from gender differences in other personality traits seems to be smaller (3.64% to 4.39). Therefore, our *Hypotheses 1d* and *2d* are confirmed.

Insert Table 7: Non-linear Decomposition of the Gender Gap in Latent and Nascent Entrepreneurship – The Contribution from Gender Differences in Competitiveness and Risk Tolerance here.

In order to test our *Hypotheses 3c* and *3d* we conduct the decomposition analysis including dummy variables reflecting different levels of *IEA*. The results of this analysis, which are reported in Table 8, suggest that gender differences in *IEA* explain 8.26% (Sample I) and 9.41% (Sample II) of the gender gap in *latent* entrepreneurship. Gender differences in *IEA* seem to be more important for the gender gap in *nascent entrepreneurship*. The contribution from gender differences in *IEA* ranges from 14.8% to 21.52%. Hence, the results of decomposition analyses suggest that gender differences in *IEA* between men and women contribute significantly to gender gap in nascent entrepreneurship. Accordingly, we find our *Hypothesis 3c* and *3d* confirmed.

However, a comparison of the results reported in Table 8 and the results reported in Table 7 shows that the estimated contribution from task matched personality traits to nascent entrepreneurship is very similar, irrespective whether indicators for competitiveness, risk tolerance and other task matched traits are used or indicators reflecting

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[24] The characteristics effect is computed as the sum of contributions of all explanatory variable. The contribution of each variable to the gender gap in latent entrepreneurship equals the change in the average predicted probability replacing the distribution of the respective variable of women by the distribution of the respective variable of men holding the distribution of the other variables constant (see Fairlie 2005).

different levels of *IEA*. This might be expected, since the descriptive statistics presented in Section 4 show that about 60% of the gender differences in *IEA* are due to differences in competitiveness and risk tolerance. Consequently, particularly gender differences in competitiveness and risk tolerance contribute significantly to the gender gap in latent and nascent entrepreneurship. Nevertheless, it is useful to analyze the joint effect of task matched personality traits, since our estimation results presented in Section 5.2 and 5.3 show that particularly men and women scoring high on all or almost all analyzed task matched personality traits are much more likely to be latent and nascent entrepreneurs.

Insert Table 8: Non-linear Decomposition of the Gender Gap in Latent and Nascent Entrepreneurship – The Joint Contribution here.

6. Conclusion

Although female entrepreneurship has attracted great attention in academic research in recent years, our knowledge of the determinants of the gender gap in entrepreneurship is still limited. External factors, like business environment, access to finance or work-family conflicts, surely contribute to the gender gap. However, for a better understanding of the gender gap and for the design of appropriate entrepreneurship policy measures it is important to consider psychological factors as well.

The focus of this paper is on the relevance of gender differences in personality traits in explaining the gender gap in entrepreneurship. In particular, it is argued that personality traits that can be matched to the tasks of entrepreneurs may predispose men and women to entrepreneurship. Consequently, gender differences in these personality traits may contribute to the gender gap in entrepreneurship. In order to empirically investigate the relationship between entrepreneurship and task matched personality traits, a dataset is used that covers 36 countries (Flash Eurobarometer *Entrepreneurship* 2009). In this survey, we were allowed to include eight items measuring task matched personality traits. Furthermore, the dataset contains information about individuals' preference for being self-employed (*latent entrepreneurship*) and individuals' start-up activities (*nascent entrepreneurship*).

We find that latent entrepreneurship and nascent entrepreneurship are positively related to *competitiveness* and *risk tolerance*. Individuals who are competitively inclined and who are willing to take risks are more likely to be latent and nascent entrepreneurs. Moreover, our results provide empirical evidence for a strong *joint effect* of the eight task matched personality traits analyzed in this paper: particularly individuals scoring very high on all or almost all of these personality traits are much more likely to be latent and nascent entrepreneurs. The joint effect is also much higher than the partial effects of competitiveness and risk tolerance. Our results also point to a strong and positive direct relationship between nascent entrepreneurship and task matched personality traits even when controlling for latent entrepreneurship. These results are confirmed by gender-specific regressions based on sub-samples of men and women. This indicates that the analyzed task matched personality traits are relevant determinants of both, male as well as female entrepreneurship.

Furthermore, we find gender differences in task matched personality traits: women's average scores of competitiveness are significantly lower than average scores of men in 32 countries. This is in line with the results of experimental studies suggesting that "men are more competitively inclined than women" (Gneezy 2009, p. 1637).

The level of risk tolerance of women is also significantly lower than men's level of risk tolerance in the majority of countries. For the other analyzed task matched personality traits the results are less clear-cut. The results of a decomposition analysis suggest that particularly gender differences in competitiveness and risk tolerance contribute to the gender gap in latent and nascent entrepreneurship. Hence, our findings imply that the distribution of task matched personality traits is less favorable for latent and nascent entrepreneurship among women.

This finding is of substantial concern from a societal perspective, since it implies considerable costs in terms of foregone economic growth. Women may not exploit promising opportunities by starting new businesses if they are less competitively inclined. Niederle and Vesterlund (2011) argue that governments may adopt two different approaches to encourage women to enter competition. First, governments may take the gender difference in competitiveness as given and change the institutions under which men and women compete. The adoption of an affirmative action quota system is an example for such an institutional change. Second, governments may try to change the preferences for competition. It is central question in this discussion, however, whether preferences for competition are innate and immutable or whether they are malleable.

The results of our study do not allow us to draw conclusions about the reasons for gender differences in competitiveness or other task matched personality traits. Therefore, we cannot say to what extent task matched traits are innate and to what extent they are mutable. While an analysis of the determinants of gender differences in personality traits is beyond the scope of this study, it would be a fruitful endeavor for future research to investigate factors determining gender differences in task matched personality traits. A rapidly growing literature on gender differences in competition suggests that competitiveness results both from nurture and nature (see Niederle and Vesterlund 2007 for a discussion).

Moreover, other factors than task matched personality traits are likely to be highly relevant for female entrepreneurship. For instance, women's occupational choice may be constrained by gender stereotypes (Bird and Brush 2002) and gender-specific segregation in the labor market. Perceived stereotypes or roles tend to matter, as some jobs are viewed as "men's work", other jobs are viewed as "women's work" (Heilman 1997). The results of an empirical analysis conducted by Gupta et al. (2009) suggest that self-employment is indeed perceived as a masculine field and as "manly" work. The literature on female entrepreneurship also suggests that women may face more severe obstacles to business creation than men which may hinder their engagement in entrepreneurship, e.g. limited access to finance (Becker-Blease and Sohl 2007, Riding and Swift 1990, Verheul and Thurik 2001) or network constraints (Ruef et al. 2003). Although, we control for perceived obstacles to business creation (lack of information, lack of financial support, and administrative burdens) as well as for country-specific fixed effects (capturing all unobserved effects at the country-level, e.g. culture) in our empirical analysis, there is still a need for further research. Future research could analyze, for instance, the interrelation between gender stereotypes and gender differences in task matched personality traits.

Albeit our dataset comprises unique information about task matched personality traits of individuals in 36 countries, there are significant limitations. It can be criticized that using one item to measure each trait is a significant limitation, since this may result in severe measurement error problems. Measurement error in an

explanatory variable tends to bias the estimated effect of the respective variable towards zero (attenuation bias) and measurement error may therefore be simply too high if single item measures or a summed index of these measures is used. However, our results point to a high magnitude of the estimated effects of competitiveness, risk tolerance and *IEA* on latent and nascent entrepreneurship. Hence, in the presence of measurement errors our estimates may represent the lower bound of the true effects of task matched personality traits.

Another concern is whether the task matched personality traits analyzed in this study actually capture 'female' entrepreneurial traits. Although we make use of items obtained from validated scales, we acknowledge that these items may measure 'male' entrepreneurial traits very well but they may not necessarily capture 'female' entrepreneurial traits (see Mirchandani 1999, Ahl 2006). Hence, men's decision to start a business may be related to these personality traits (items), while women's decision to start a business may be influenced by other personality traits. However, this should be less of a concern as the results of our gender-specific regressions suggest that women's preferences for self-employment as well as female nascent entrepreneurship are significantly related to task matched personality traits. However, future research could investigate to what extent task matched traits measure female entrepreneurial traits.

Moreover, our study focuses on personality traits which can be matched to the tasks of entrepreneurs and does control for other possibly relevant personality traits. Prior research shows that higher order personality trait dimensions (e.g. the Big Five) may also have an influence on male and female entrepreneurship (Zhao and Seibert 2006, Zhao et al. 2010) and the effect of broad personality traits on new venture creation may be mediated by task matched traits (Hisrich et al. 2007). For instance, the results of recent experimental studies suggest that the choice to compete may be related to broad personality factors, such as agreeableness (Bartling et al. 2009) and neuroticism (Müller and Schwieren 2012). Future research would therefore benefit from examining the possible links between higher order personality trait dimensions, task matched personality traits and entrepreneurship.

While we use a substantial number of control variables in our empirical analyses to avoid omitted variable bias, we are not able to control for all potentially relevant variables. For instance, we cannot control for number of children in the household or marital status, which may affect latent and nascent entrepreneurship among men and women. Although the results of recent empirical studies suggest that personality traits still have significant effects on female entrepreneurship even if marital status and number of children are controlled for (Furdas and Kohn 2010, Caliendo et al. 2011), future research analyzing the relationship between female entrepreneurship and task matched personality traits should take into account relevant variables, such as family background.

This paper has affirmed that the gender gap in latent and nascent entrepreneurship originates to some extent from gender differences in task matched personality traits. Especially the level of competitiveness differs significantly between men and women. Although Schumpeter emphasized the relevance of competitiveness as major motivation for individual engagement in entrepreneurship, the role of competitiveness for new venture creation has been largely neglected in previous empirical research. Our results provide empirical evidence for the relevance of competitiveness for new venture creation and indicate that particularly gender differences in competitiveness contribute to the gender gap in latent and nascent entrepreneurship. While our paper represents a first step towards a

better understanding of the relevance of competitiveness for the gender gap in entrepreneurship, certainly more research is needed to analyze the link between competitiveness and men's and women's engagement in entrepreneurial activities.

Appendix

Table A 1: Variable Definition

Variable Name	Definition
Dependent Variables	
Latent Entrepreneurship	Dummy variable = 1 if the respondent prefers to be self-employed if he could choose between being self-employed and being employee, zero otherwise.
Nascent Entrepreneurship	Dummy variable = 1 if the respondent is currently taking steps to start a business, zero otherwise
Personality Traits	
Competitiveness	Dummy variable = 1, if the respondent agrees or strongly agrees with the statement and set to zero, if the respondent disagrees or strongly disagrees with the statement.
Risk tolerance	Dummy variable = 1, if the respondent agrees or strongly agrees with the statement and set to zero, if the respondent disagrees or strongly disagrees with the statement.
Other six personality traits	The average score in the six task matched personality traits is computed. Dummy variable = 1, if the average score is at least three (*agreement or strong agreement*), zero otherwise. The six task matched personality traits are *autonomy, innovativeness, proactiveness, internal locus of control, general self-efficacy* and *general optimism.*
IEA – Individual Entrepreneurial Aptitude	Summed index formed by eight personality traits typically matched to the tasks of entrepreneurs. The eight traits are *competitiveness, risk tolerance, autonomy, innovativeness, proactiveness, general optimism, general self-efficacy*, and *internal locus of control.* Measure by a set of dummy variables: score of 8 to 20 (reference group) score of 21 to 23, score of 24 to 26, score of 27 to 29, score of 30 to 32. For single item measurement of the personality traits forming *IEA* see Table 1.
Further Control Variables	
Female	Dummy variable = 1 if the individual is female and zero otherwise
Age	Age reported by the respondent. Measure by a set of dummy variables: age 15 to 25, age 26 to 35, age 36 to 45 (reference group), age of 54 to 64
Education (ln)	ln of age finished fulltime education reported by the respondent
Parental Self-Employment	Dummy variable = 1 if the individual has at least one parent to be self-employed, zero otherwise
Income Satisfaction	Measured by a set of dummy variables: *high*: dummy variable = 1 if the individual lives comfortable on the present household income; *moderate* (reference group): dummy variable = 1 if the individual gets along with the present household income; *dissatisfaction*: dummy variable = 1 if the individual finds it difficult or very hard to manage on the present household income, zero otherwise.
Social Status of Entrepreneurs	How the respondent values the status of entrepreneurs relative to civil servants, top-managers in large production companies, managers in a bank or similar institutions, politicians, liberal professions (architect, lawyers, artists etc.). We compute the value assigned to entrepreneurs over the averaged scoring assigned to the other proposed occupational groups.
Obstacles to Entrepreneurial Activity	
Lack of financial Support	Dummy variable = 1 if the respondent strongly agrees with the statement that it is difficult to start one's own business due to the lack of available financial support, zero otherwise.
Insufficient Information	Dummy variable = 1 if the respondent strongly agrees with the statement that it is difficult to start one's own business due to the complex administrative procedures and zero otherwise.
Administrative Burdens	Dummy variable = 1 if the respondent strongly agrees with the statement that it is difficult to obtain sufficient information on how to start a business, zero otherwise.

Notes: All data are obtained from the Flash Eurobarometer *Entrepreneurship* 2009

Table A 2: Summary Statistics

Variable	Female (58.88%; n=4918)				Male (41.12%: n=3434)			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Latent Entrepreneurs	40.73%	0.491	0	1	49.21%	0.500	0	1
Nascent Entrepreneurs	5.19%	0.222	0	1	8.12%	0.273	0	1
Start-Up Experience	17.36%	0.379	0	1	27.34%	0.446	0	1
Competitiveness	49.84%	0.500	0	1	67.50%	0.468	0	1
Risk Tolerance	61.65%	0.486	0	1	71.46%	0.452	0	1
other six task matched Personality Traits	60.70%	0.488	0	1	67.21%	0.470	0	1
Individual Entrepreneurial Aptitude								
IEA score of 8 to 20	16.59%	0.372	0	1	9.96%	0.299	0	1
IEA score of 21 to 23	36.64%	0.482	0	1	33.49%	0.472	0	1
IEA score of 24 to 26	28.04%	0.449	0	1	32.62%	0.469	0	1
IEA score of 27 to 29	13.50%	0.342	0	1	16.51%	0.371	0	1
IEA score of 30 to 32	5.23%	0.223	0	1	7.43%	0.262	0	1
at least one Parent Self-Employed	26.64%	0.442	0	1	24.75%	0.432	0	1
Social Status of Entrepreneurs	1.21	0.381	0.333	3	1.245	0.398	0.333	3
Income Satisfaction high	31.98%	0.466	0	1	28.36%	0.451	0	1
Income Satisfaction moderate	46.62%	0.499	0	1	47.52%	0.499	0	1
Income Dissatisfaction	21.39%	0.410	0	1	24.11%	0.428	0	1
Age group 15 to 25	7.44%	0.262	0	1	24.75%	0.432	0	1
Age group 26 to 35	21.09%	0.408	0	1	10.80%	0.310	0	1
Age group 36 to 45	29.79%	0.457	0	1	21.43%	0.410	0	1
Age group 46 to 55	27.65%	0.447	0	1	27.96%	0.449	0	1
Age group 56 to 64	14.03%	0.347	0	1	26.32%	0.440	0	1
Age finished fulltime education	19.979	4.435	9	45	13.48%	0.342	0	1
Obstacles to entrepreneurial activity								
Lack of Financial Support	37.35%	0.484	0	1	33.90%	0.473	0	1
Administrative Burdens	28.81%	0.453	0	1	26.15%	0.440	0	1
Lack of Information	18.52%	0.389	0	1	16.72%	0.373	0	1
White-Collar Employment								
Professional	8.76%	0.283	0	1	11.30%	0.317	0	1
General Management	1.20%	0.109	0	1	2.97%	0.170	0	1
Management	1.83%	0.134	0	1	3.26%	0.178	0	1
Middle Management	5.21%	0.222	0	1	9.03%	0.287	0	1
Civil Servant	12.48%	0.331	0	1	11.50%	0.319	0	1
Office Clerk	15.17%	0.359	0	1	10.92%	0.312	0	1
White-Collar, Other	9.72%	0.296	0	1	9.93%	0.299	0	1
Blue-Collar Employment								
Supervisor/Foreman	1.10%	0.104	0	1	2.88%	0.167	0	1
Skilled Manual Worker	5.69%	0.232	0	1	15.32%	0.360	0	1
Unskilled Manual Worker	4.15%	0.199	0	1	5.07%	0.219	0	1
Blue-Collar, Other	1.38%	0.117	0	1	2.01%	0.140	0	1
Without Professional Activity								
Looking after the Home	22.08%	0.415	0	1	1.16%	0.107	0	1
Seeking a Job	7.65%	0.266	0	1	11.47%	0.319	0	1
Without Prof. Activity, Other	3.58%	0.186	0	1	3.17%	0.175	0	1
Area								
Metropolitan Zone	21.68%	0.412	0	1	25.83%	0.438	0	1
Town/Urban Center	43.82%	0.496	0	1	40.89%	0.492	0	1
Rural Zone	34.51%	0.475	0	1	33.28%	0.471	0	1

Country
36 Dummy Variables for county are included in to regression. (32 European Countries plus Japan, South Korea, China and the US)

Notes. Descriptive statistics are based on the maximum number of individuals included in analysis (8352 individuals, 4918 women and 3434 men).

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Table 1: Items measuring the relevant task match personality traits that form Individual Entrepreneurial Aptitude *(IEA)*

In general, I am willing to take risks.	*(Risk Tolerance)*
(adapted from the SOEP, see Dohmen et al. 2011)	
Generally, when facing difficult tasks, I am certain that I will accomplish them.	*(General Self-Efficacy)*
(adapted from Chen et al. 2001)	
My life is determined by my own actions, not by others or by chance.	*(internal vs. external Locus of Control)*
(adapted from Rotter 1966 and Levenson 1974)	
If I see something I do not like, I change it.	*(Proactiveness)*
(adapted from Bateman and Crant 1993)	
The possibility of being rejected by others for standing up for my decisions would not stop me.	*(Autonomy)*
(adapted from Clark and Beck 1991)	
I am an inventive person who has ideas.	*(Innovativeness)*
(adapted from Hurt et al. 1977)	
I am optimistic about my future.	*(General Optimism)*
(adapted from Scheier et al. 1994)	
I like situations in which I compete with others.	*(Competitiveness)*
(adapted from Helmreich and Spence 1978)	

Notes: Items are slightly modified in wording when necessary.

Table 2: Differences between Men and Women in Average Scores of *IEA* and Single Personality Traits

Country	IEA	Competitiveness	Risk Tolerance	Innovativeness	Self-Efficacy	Autonomy	General Optimism	Proactiveness	Internal Locus of control	Share of Women	n
United Kindom	-1.260***	-0.451***	-0.199***	-0.182***	-0.191***	-0.129**	-0.107*	0.008	-0.009	56%	875
Portugal	-0.988***	-0.283***	-0.226***	-0.134***	-0.061	-0.029	-0.145***	-0.021	-0.0886**	59%	826
France	-0.953***	-0.388***	-0.142**	-0.031	-0.021	-0.089	-0.174***	-0.011	-0.0976*	62%	921
Greece	-0.818***	-0.398***	-0.084	-0.0866**	-0.0906**	-0.003	0.113*	-0.143***	-0.126**	59%	906
Germany	-0.774***	-0.326***	-0.263***	-0.005	-0.0862**	-0.0988**	0.022	-0.035	0.018	53%	928
Ireland	-0.751**	-0.279***	-0.102	-0.071	-0.024	-0.177**	-0.053	-0.072	0.027	58%	456
Spain	-0.738***	-0.277***	-0.0806*	-0.0803**	-0.100***	-0.123***	-0.056	0.018	-0.040	56%	934
Luxembourg	-0.645**	-0.220***	-0.065	-0.089	-0.051	-0.032	-0.109*	-0.003	-0.077	63%	474
Italy	-0.614***	-0.296***	-0.147***	-0.171***	-0.020	0.052	0.020	-0.067	0.015	56%	808
Austria	-0.595**	-0.402***	-0.229***	0.021	-0.096	-0.012	-0.023	0.058	0.089	55%	447
Finland	-0.534*	-0.372***	-0.213***	0.097	-0.070	0.040	0.0991*	-0.035	-0.081	52%	452
Netherlands	-0.336**	-0.179***	-0.121***	-0.010	-0.026	-0.0779**	0.000	0.0696**	0.008	54%	868
Sweden	-0.297	-0.282***	0.001	-0.060	-0.027	-0.001	0.042	-0.002	0.030	52%	423
Denmark	-0.214	-0.189***	-0.061	-0.027	0.023	-0.047	0.028	0.045	0.014	53%	448
Belgium	-0.045	-0.103	-0.098	-0.050	0.0871*	0.053	0.018	0.025	0.022	63%	814
EU15	**-0.684***	**-0.294***	**-0.139***	**-0.0664***	**-0.0616***	**-0.0491***	**-0.0385***	**-0.00918**	**-0.0258***	**57%**	**10,580**
Slovenia	-1.224***	-0.409***	-0.324***	-0.070	-0.114*	-0.026	-0.160**	-0.189***	0.067	62%	450
Latvia	-1.217***	-0.279***	-0.353***	-0.082	-0.157**	-0.250***	-0.028	-0.008	-0.061	69%	393
Hungary	-0.820***	-0.315***	-0.246***	-0.137***	-0.104*	0.014	-0.021	-0.039	0.029	66%	832
Cypris	-0.769***	-0.146**	-0.224***	-0.102*	-0.046	-0.038	-0.110*	-0.051	-0.052	55%	438
Czech Republic	-0.744***	-0.277***	-0.158***	-0.131**	-0.016	-0.0193	-0.153***	0.028	-0.018	60%	851
Romania	-0.714**	-0.143*	-0.008	-0.016	-0.052	-0.035	-0.263***	-0.176***	-0.020	59%	414
Lithuania	-0.679*	-0.180**	-0.185**	-0.100	-0.061	0.000	-0.046	-0.070	-0.037	65%	406
Malta	-0.600*	-0.102	-0.134*	-0.063	-0.152**	-0.027	-0.025	-0.047	-0.050	56%	405
Slovakia	-0.585*	-0.083	-0.153**	-0.034	-0.055	-0.030	-0.077	-0.135**	-0.020	66%	445
Bulgaria	-0.580	-0.215**	-0.159*	-0.095	-0.003	0.001	-0.069	-0.015	-0.025	64%	415
Poland	-0.521**	-0.310***	-0.0988*	-0.039	-0.018	0.007	-0.007	-0.033	-0.022	62%	791
Estonia	-0.391	-0.080	-0.173*	-0.102	-0.079	-0.069	0.042	-0.012	0.082	67%	366
EU27	**-0.754***	**-0.279***	**-0.164***	**-0.0789***	**-0.0682***	**-0.0499***	**-0.0574***	**-0.0358***	**-0.0208***	**59%**	**16,786**
China	-1.019***	-0.269***	-0.308***	-0.122**	-0.123***	0.028	-0.062	-0.144***	-0.020	45%	983
USA	-0.987***	-0.557***	-0.230***	-0.0952*	-0.018	-0.063	0.022	-0.116***	0.069	54%	972
Turkey	-0.929***	-0.251***	-0.254***	-0.069	-0.050	-0.149***	0.013	-0.015	-0.154***	52%	469
Japan	-0.894***	-0.261***	-0.191***	-0.194***	-0.079	-0.115**	0.019	-0.004	-0.068	54%	876
Croatia	-0.853**	-0.241**	-0.307***	0.129	-0.154*	-0.069	-0.029	-0.077	-0.105	59%	396
Norway	-0.586**	-0.320***	-0.022	-0.050	-0.062	-0.035	0.011	-0.051	-0.056	51%	429
South Korea	-0.506**	-0.209***	-0.066	-0.110**	-0.054	-0.138***	0.135***	-0.0847*	0.020	53%	842
Island	-0.376	-0.402***	-0.157*	0.038	-0.028	0.050	0.005	-0.023	0.140**	48%	363
Switzerland	-0.239	-0.332***	-0.039	0.034	0.011	0.059	0.052	-0.043	0.019	61%	438
TOTAL	**-0.761***	**-0.297***	**-0.168***	**-0.0751***	**-0.0735***	**-0.0458***	**-0.0427***	**-0.0369***	**-0.0223****	**57%**	**22,554**

Notes: Mean comparison test is based on a sample of 22554 observations, 9627 men and 12927 women as the maximum number of individuals who answered to each item measuring the task matched personality traits and therefore to each item measuring *IEA*. Difference: mean(FEMALE)-mean(MALE); Test of H0: difference in Means =0; Level of Significance: *** p<0.01, ** p<0.05, * p<0.1

Table 3: Determinants of *Latent* Entrepreneurship: Competitiveness and Risk Tolerance – Pooled and Gender-Specific Probit Estimations

VARIABLES	Employable Population (Sample I)				Employees (Sample II)			
	pooled(a)	pooled(b)	female(c)	male(d)	pooled(a)	pooled(b)	female(c)	male(d)
Female	-0.0779***	-0.0666***			-0.0794***	-0.0670***		
	(0.0137)	(0.0139)			(0.0147)	(0.0149)		
Competitiveness		0.0405***	0.0489***	0.0219		0.0385**	0.0444**	0.0227
		(0.0132)	(0.0164)	(0.0226)		(0.0151)	(0.0193)	(0.0246)
Risk Tolerance		0.0893***	0.0859***	0.100***		0.0979***	0.0892***	0.116***
		(0.0134)	(0.0167)	(0.0226)		(0.0153)	(0.0197)	(0.0242)
Other six Personality Traits		0.0243*	0.00923	0.0457**		0.0299*	0.0141	0.0456*
		(0.0137)	(0.0173)	(0.0227)		(0.0157)	(0.0205)	(0.0246)
At least one Parent self-employed	0.0385***	0.0368**	0.0299	0.0492**	0.0283	0.0270	0.00622	0.0602**
	(0.0149)	(0.0150)	(0.0188)	(0.0250)	(0.0173)	(0.0173)	(0.0226)	(0.0271)
Social Status of Entrepreneurs	0.0629***	0.0626***	0.0495**	0.0860***	0.0493**	0.0480**	0.0291	0.0745**
	(0.0165)	(0.0165)	(0.0211)	(0.0269)	(0.0196)	(0.0197)	(0.0264)	(0.0298)
Income Satisfaction high	-0.0404**	-0.0457***	-0.0315	-0.0674**	-0.0613***	-0.0663***	-0.0701***	-0.0663**
	(0.0167)	(0.0167)	(0.0213)	(0.0271)	(0.0182)	(0.0182)	(0.0236)	(0.0284)
Income Satisfaction low	0.0349**	0.0374**	0.0342*	0.0469*	0.0473***	0.0523***	0.0365	0.0731**
	(0.0151)	(0.0152)	(0.0186)	(0.0264)	(0.0180)	(0.0182)	(0.0231)	(0.0296)
Age 15 to 25	0.0632**	0.0476*	0.0343	0.0767**	0.0586*	0.0436	0.0567	0.0305
	(0.0251)	(0.0250)	(0.0335)	(0.0385)	(0.0300)	(0.0297)	(0.0412)	(0.0435)
Age 26 to 35	0.0124	0.00502	-0.0211	0.0429	0.0231	0.0157	0.00276	0.0252
	(0.0175)	(0.0175)	(0.0216)	(0.0295)	(0.0198)	(0.0198)	(0.0256)	(0.0311)
Age 46 to 55	0.0121	0.0160	0.00986	0.0326	0.0113	0.0152	0.00770	0.0302
	(0.0166)	(0.0167)	(0.0207)	(0.0283)	(0.0186)	(0.0187)	(0.0239)	(0.0299)
Age 56 to 64	-0.0435**	-0.0389*	-0.0501**	-0.00378	-0.0459*	-0.0408*	-0.0412	-0.0312
	(0.0202)	(0.0204)	(0.0248)	(0.0358)	(0.0240)	(0.0242)	(0.0314)	(0.0386)
Education (ln)	0.00446	-0.000329	0.0808*	-0.114*	-0.0190	-0.0225	0.0969*	-0.152**
	(0.0361)	(0.0361)	(0.0453)	(0.0606)	(0.0434)	(0.0435)	(0.0570)	(0.0683)
Occupation	Yes***	Yes***	Yes***	Yes	Yes	Yes	Yes	Yes
	39.35	45.55	51.76	11.13	11.18	11.18	9.13	9.66
Area	Yes***	Yes***	Yes**	Yes**	Yes***	Yes***	Yes*	Yes**
	14.88	16.65	8.89	8.26	12.23	12.23	5.66	7.75
Country	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
	342.11	288.49	217.08	126.6	218.3	218.3	146.49	128.66
Observations	6559	6559	4064	2495	4893	4893	4893	2136
Pseudo R² (Mc Fadden)	0.0602	0.0687	0.0773	0.0745	0.0631	0.0732	0.0788	0.0857

Notes. Probit estimation reporting marginal effects on the probability to be latent entrepreneur. Regression analysis is conducted for the employable population (Sample I) and for employees (Sample II). Self-employed and individuals and individuals with start-up experience are excluded. Regressions (c) and (d) are based on the subsamples of women and men. Competitiveness, and risk tolerance are measured by a dummy variable that is set to one, if the respondent at least agrees with the respective statement, otherwise the dummy variable is set to zero which is the reference group in regression analysis. Reference income satisfaction: moderate; reference age: age group 36 to 45; reference occupation: blue collar manual worker; reference area: rural zone; reference country: USA. Robust standard errors in parentheses; Level of significance: *** p<0.01, ** p<0.05, * p<0.1

Table 4: Determinants of *Latent* Entrepreneurship: Joint Effect of *IEA* – Pooled and Gender-Specific Probit Estimations

VARIABLES	Employable Population (Sample I)				Employees (Sample II)			
	pooled(a)	pooled(b)	female(c)	male(d)	pooled(a)	pooled(b)	female(c)	male(d)
Female	-0.0779***	-0.0727***			-0.0794***	-0.0734***		
	(0.0137)	(0.0137)			(0.0147)	(0.0147)		
IEA Score 21 to 23		0.0824***	0.0839***	0.0750**		0.0717***	0.0617**	0.0767*
		(0.0200)	(0.0238)	(0.0369)		(0.0240)	(0.0292)	(0.0417)
IEA Score 24 to 26		0.103***	0.0885***	0.121***		0.0984***	0.0644**	0.133***
		(0.0212)	(0.0257)	(0.0382)		(0.0254)	(0.0316)	(0.0430)
IEA Score 27 to 29		0.133***	0.101***	0.175***		0.140***	0.0882**	0.194***
		(0.0257)	(0.0318)	(0.0441)		(0.0304)	(0.0383)	(0.0491)
IEA Score 30 to 32		0.207***	0.229***	0.172***		0.229***	0.245***	0.199***
		(0.0342)	(0.0444)	(0.0562)		(0.0407)	(0.0556)	(0.0625)
At least one Parent self-employed	0.0385***	0.0363**	0.0296	0.0482*	0.0283	0.0264	0.00427	0.0607**
	(0.0149)	(0.0149)	(0.0188)	(0.0250)	(0.0173)	(0.0173)	(0.0225)	(0.0271)
Social Status of Entrepreneurs	0.0629***	0.0624***	0.0520**	0.0839***	0.0493**	0.0477**	0.0317	0.0713**
	(0.0165)	(0.0166)	(0.0211)	(0.0269)	(0.0196)	(0.0197)	(0.0265)	(0.0298)
Income satisfaction High	-0.0404**	-0.0462***	-0.0321	-0.0674**	-0.0613***	-0.0685***	-0.0733***	-0.0663**
	(0.0167)	(0.0167)	(0.0213)	(0.0271)	(0.0182)	(0.0182)	(0.0235)	(0.0284)
Income Satisfaction Low	0.0349**	0.0404***	0.0368**	0.0494*	0.0473***	0.0536***	0.0353	0.0759**
	(0.0151)	(0.0152)	(0.0186)	(0.0265)	(0.0180)	(0.0182)	(0.0230)	(0.0297)
Age 15 to 25	0.0632**	0.0559**	0.0418	0.0873**	0.0586*	0.0525*	0.0652	0.0417
	(0.0251)	(0.0251)	(0.0337)	(0.0386)	(0.0300)	(0.0299)	(0.0416)	(0.0437)
Age 26 to 35	0.0124	0.0105	-0.0156	0.0471	0.0231	0.0210	0.00891	0.0300
	(0.0175)	(0.0175)	(0.0216)	(0.0295)	(0.0198)	(0.0199)	(0.0256)	(0.0310)
Age 46 to 55	0.0121	0.0157	0.00884	0.0342	0.0113	0.0151	0.00698	0.0320
	(0.0166)	(0.0167)	(0.0207)	(0.0283)	(0.0186)	(0.0187)	(0.0239)	(0.0298)
Age 56 to 64	-0.0435**	-0.0395*	-0.0507**	-0.00498	-0.0459*	-0.0419*	-0.0444	-0.0303
	(0.0202)	(0.0203)	(0.0247)	(0.0357)	(0.0240)	(0.0241)	(0.0311)	(0.0386)
Education (ln)	0.00446	0.00468	0.0863*	-0.111*	-0.0190	-0.0192	0.100*	-0.149**
	(0.0361)	(0.0362)	(0.0453)	(0.0608)	(0.0434)	(0.0435)	(0.0571)	(0.0685)
Occupation	Yes***	Yes***	Yes***	Yes	Yes	Yes	Yes	Yes
	39.35	43.06	49.45	11.58	11.97	11.26	9.72	9.67
Area	Yes***	Yes***	Yes**	Yes**	Yes***	Yes***	Yes	Yes**
	14.88	16.85	8.34	8.41	12.41	13.43	6.20**	7.81
Country	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
	342.11	308.56	231.73	129.34	254.64	233.09	157.70	131.15
Observations	6559	6559	4064	2495	4893	4893	2757	2136
Pseudo R² (Mc Fadden)	0.0602	0.0657	0.0746	0.0718	0.0631	0.0695	0.0757	0.0822

Notes. Probit estimation reporting marginal effects on the probability to be latent entrepreneur. Regression analysis is conducted for the employable population (Sample I) and for employees (Sample II). Self-employed and individuals and individuals with start-up experience are excluded. Regressions (c) and (d) are based on the subsamples of women and men. Reference *IEA category*: score of 8 to 20; reference income satisfaction: moderate; reference age: age group 36 to 45; reference occupation: blue collar manual worker; reference area: rural zone; reference country: USA. robust standard errors in parentheses; Level of significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 5: Determinants of *Nascent* Entrepreneurship: Competitiveness and Risk Tolerance – Pooled and Gender-Specific Probit Estimations

	Employable Population								Employable Population with a Preference for Self-Employment			
	(Model I)				(Model II)				(Model III)			
VARIABLES	pooled(a)	pooled(b)	female(c)	male(d)	pooled(a)	pooled(b)	female(c)	male(d)	pooled(a)	pooled(b)	female(c)	male(d)
Female	-0.0189***	-0.0136***			-0.00997**	-0.00705*			-0.0216**	-0.0154		
	(0.00513)	(0.00492)			(0.00428)	(0.00416)			(0.0108)	(0.0107)		
Competitiveness		0.0166***	0.0140***	0.0217***		0.0113***	0.00898**	0.0157**		0.0276***	0.0236**	0.0375**
		(0.00457)	(0.00477)	(0.00822)		(0.00387)	(0.00384)	(0.00725)		(0.0102)	(0.0112)	(0.0176)
Risk Tolerance		0.0171***	0.00917*	0.0299***		0.00950**	0.00435	0.0186**		0.0235**	0.00660	0.0493***
		(0.00467)	(0.00484)	(0.00824)		(0.00405)	(0.00390)	(0.00748)		(0.0110)	(0.0125)	(0.0183)
Other six Personality Traits		0.0163***	0.0115**	0.0249***		0.0108***	0.00674*	0.0184**		0.0210**	0.0274**	0.0166
		(0.00457)	(0.00475)	(0.00816)		(0.00392)	(0.00377)	(0.00733)		(0.0107)	(0.0117)	(0.0186)
Preference for self-employment					0.0710***	0.0661***	0.0527***	0.0789***				
					(0.00526)	(0.00517)	(0.00629)	(0.00832)				
At least one Parent self-employed	0.0110**	0.00895*	0.0108*	0.00517	0.00512	0.00418	0.00700	-0.00135	0.0221*	0.0200*	0.0216	0.0153
	(0.00552)	(0.00523)	(0.00563)	(0.00928)	(0.00443)	(0.00427)	(0.00445)	(0.00764)	(0.0117)	(0.0115)	(0.0133)	(0.0189)
Social Status of Entrepreneurs	0.0231***	0.0210***	0.0216***	0.0190**	0.0137***	0.0128***	0.0140***	0.0104	0.0362***	0.0342***	0.0469***	0.0262
	(0.00565)	(0.00543)	(0.00566)	(0.00963)	(0.00475)	(0.00463)	(0.00470)	(0.00834)	(0.0124)	(0.0122)	(0.0147)	(0.0197)
Income Satisfaction high	0.00514	0.00246	-0.000157	0.0109	0.00600	0.00399	0.00103	0.0127	0.00891	0.00440	-0.00157	0.0229
	(0.00633)	(0.00599)	(0.00612)	(0.0113)	(0.00546)	(0.00524)	(0.00502)	(0.0103)	(0.0141)	(0.0138)	(0.0156)	(0.0243)
Income Satisfaction low	0.00132	0.00245	-0.00118	0.00805	-0.000451	0.000352	-0.00216	0.00503	0.000469	0.00185	-0.00610	0.0108
	(0.00554)	(0.00541)	(0.00531)	(0.0104)	(0.00452)	(0.00446)	(0.00412)	(0.00884)	(0.0119)	(0.0118)	(0.0130)	(0.0203)
Age 15 to 25	0.0526***	0.0443***	0.0264**	0.0673***	0.0406***	0.0360***	0.0186*	0.0591***	0.0900***	0.0826***	0.0746**	0.1000***
	(0.0129)	(0.0120)	(0.0126)	(0.0213)	(0.0110)	(0.0105)	(0.00991)	(0.0198)	(0.0250)	(0.0243)	(0.0319)	(0.0375)
Age 26 to 35	0.0363***	0.0312***	0.0198***	0.0503***	0.0286***	0.0255***	0.0161**	0.0431***	0.0718***	0.0658***	0.0521***	0.0893***
	(0.00820)	(0.00768)	(0.00776)	(0.0147)	(0.00698)	(0.00664)	(0.00647)	(0.0132)	(0.0172)	(0.0166)	(0.0194)	(0.0280)
Age 46 to 55	-0.00203	-0.000996	-0.00364	0.00780	-0.00345	-0.00271	-0.00462	0.00507	-0.00529	-0.00334	-0.00743	0.00992
	(0.00627)	(0.00614)	(0.00597)	(0.0118)	(0.00516)	(0.00511)	(0.00466)	(0.0103)	(0.0137)	(0.0138)	(0.0154)	(0.0244)
Age 56 to 64	-0.0131*	-0.0116*	-0.0192***	0.00632	-0.00971*	-0.00896	-0.0142***	0.00583	-0.0226	-0.0218	-0.0403***	0.0105
	(0.00703)	(0.00689)	(0.00551)	(0.0151)	(0.00590)	(0.00583)	(0.00440)	(0.0132)	(0.0163)	(0.0162)	(0.0147)	(0.0315)
Education (ln)	0.0567***	0.0543***	0.0486***	0.0462**	0.0463***	0.0448***	0.0354***	0.0433**	0.0841***	0.0825***	0.0735**	0.0716*
	(0.0121)	(0.0117)	(0.0123)	(0.0203)	(0.0101)	(0.00986)	(0.00990)	(0.0178)	(0.0262)	(0.0258)	(0.0299)	(0.0422)
Lack of Financial Support	-0.000201	-0.00156	-0.00524	0.00166	0.000671	-0.000167	-0.00322	0.00200	0.00579	0.00453	-0.0112	0.0158
	(0.00512)	(0.00489)	(0.00512)	(0.00873)	(0.00423)	(0.00411)	(0.00407)	(0.00755)	(0.0111)	(0.0110)	(0.0126)	(0.0183)
Administrative Burdens	-0.00708	-0.00723	-0.00222	-0.0119	-0.00395	-0.00437	-0.00131	-0.00721	-0.0175	-0.0182	-0.0121	-0.0200
	(0.00543)	(0.00522)	(0.00578)	(0.00886)	(0.00457)	(0.00444)	(0.00461)	(0.00786)	(0.0116)	(0.0115)	(0.0134)	(0.0189)
Lack of Information	0.0137*	0.0126*	0.000751	0.0327**	0.00857	0.00816	-0.000627	0.0256**	0.0229	0.0226	0.00613	0.0530**
	(0.00701)	(0.00673)	(0.00645)	(0.0133)	(0.00565)	(0.00550)	(0.00492)	(0.0114)	(0.0142)	(0.0140)	(0.0153)	(0.0253)
Occupation	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes	Yes***	Yes***	Yes***	Yes*
	72.02	71.35	61.01	33.52	60.39	60.12	53.32	33.49***	39.31	39.24	40.08	22.01
Area	Yes***	Yes***	Yes***	Yes***	Yes**	Yes**	Yes**	Yes*	Yes**	Yes**	Yes*	Yes
	13.99	14.89	10.16	9.61	6.63	7.20	7.16	5.11	6.47	7.02	5.17	3.82
Country	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
	206.44	175.71	108.44	89.52	169.04	153.66	103.05	75.76	127.86	123.8	75.23	72.75
Observation	8176	8176	4755	3354	8176	8176	4755	3354	3643	3643	1946	1623
Pseudo R² (Mc Fadden)	0.1289	0.1415	0.1661	0.1424	0.1896	0.1963	0.2265	0.1933	0.1180	0.1249	0.1676	0.1235

Notes. Probit estimation reporting marginal effects on the probability to be nascent entrepreneur. Regression analysis is conducted for the employable population. Self-employed individuals are excluded. Denmark has to be excluded from analyses (176 observations, 80male and 95 female). Regressions (c) and (d) are based on the subsamples of women and men. For the sample of women, we had to exclude additionally Malta from analysis of female nascent entrepreneurship (68observations).Reference *IEA category*: score of 8 to 20; reference income satisfaction: moderate; reference age: age group 36 to45; reference occupation: blue collar manual worker; reference area: rural zone; reference country: USA. robust standard errors in parentheses; Level of significance: *** p<0.01, ** p<0.05, * p<0.1

Table 6: Determinants of *Nascent* Entrepreneurship: Joint Effect of *IEA* – Pooled and Gender-Specific Probit Estimations

VARIABLES	Employable Population								Employable Population with a Preference for Self-Employment			
	(Model I)				(Model II)				(Model III)			
	pooled(a)	pooled(b)	female(c)	male(d)	pooled(a)	pooled(b)	female(c)	male(d)	pooled(a)	pooled(b)	female(c)	male(d)
Female	-0.0189***	-0.0144***			-0.00997**	-0.00750*			-0.0216**	-0.0158		
	(0.00513)	(0.00485)			(0.00428)	(0.00411)			(0.0108)	(0.0106)		
IEA Score 21 to 23		0.0382***	0.0234**	0.0667***		0.0261***	0.0146*	0.0494**		0.0512**	0.0347	0.0831*
		(0.0108)	(0.00967)	(0.0243)		(0.00888)	(0.00747)	(0.0207)		(0.0230)	(0.0228)	(0.0476)
IEA Score 24 to 26		0.0522***	0.0326***	0.0909***		0.0343***	0.0195**	0.0650***		0.0565**	0.0376	0.0958**
		(0.0126)	(0.0121)	(0.0264)		(0.0102)	(0.00916)	(0.0225)		(0.0239)	(0.0251)	(0.0465)
IEA Score 27 to 29		0.100***	0.0771***	0.155***		0.0654***	0.0497***	0.108***		0.127***	0.123***	0.175***
		(0.0202)	(0.0214)	(0.0412)		(0.0160)	(0.0162)	(0.0343)		(0.0332)	(0.0404)	(0.0613)
IEA Score 30 to 32		0.141***	0.0843***	0.238***		0.0876***	0.0433**	0.168***		0.166***	0.112**	0.266***
		(0.0298)	(0.0304)	(0.0590)		(0.0231)	(0.0207)	(0.0510)		(0.0443)	(0.0517)	(0.0814)
Preference for self-employment					0.0710***	0.0647***	0.0519***	0.0771***				
					(0.00526)	(0.00513)	(0.00627)	(0.00819)				
At least one Parent self-employed	0.0110**	0.00877*	0.0103*	0.00504	0.00512	0.00408	0.00660	-0.00136	0.0221*	0.0200*	0.0211	0.0148
	(0.00552)	(0.00517)	(0.00554)	(0.00918)	(0.00443)	(0.00422)	(0.00436)	(0.00754)	(0.0117)	(0.0114)	(0.0131)	(0.0187)
Social Status of Entrepreneurs	0.0231***	0.0208***	0.0212***	0.0190**	0.0137***	0.0127***	0.0138***	0.0104	0.0362***	0.0343***	0.0469***	0.0248
	(0.00565)	(0.00539)	(0.00565)	(0.00947)	(0.00475)	(0.00459)	(0.00466)	(0.00823)	(0.0124)	(0.0122)	(0.0148)	(0.0193)
Income Satisfaction High	0.00514	0.000648	-0.00151	0.00767	0.00600	0.00270	8.47e-05	0.0103	0.00891	0.000745	-0.00311	0.0143
	(0.00633)	(0.00582)	(0.00594)	(0.0109)	(0.00546)	(0.00511)	(0.00486)	(0.0100)	(0.0141)	(0.0135)	(0.0154)	(0.0234)
Income Satisfaction Low	0.00132	0.00410	0.000126	0.00990	-0.000451	0.00155	-0.00117	0.00661	0.000469	0.00537	-0.00255	0.0156
	(0.00554)	(0.00540)	(0.00529)	(0.0104)	(0.00452)	(0.00446)	(0.00410)	(0.00886)	(0.0119)	(0.0118)	(0.0130)	(0.0203)
Age 15 to 25	0.0526***	0.0451***	0.0265**	0.0682***	0.0406***	0.0365***	0.0184*	0.0599***	0.0900***	0.0858***	0.0746**	0.103***
	(0.0129)	(0.0120)	(0.0125)	(0.0212)	(0.0110)	(0.0104)	(0.00978)	(0.0197)	(0.0250)	(0.0244)	(0.0315)	(0.0380)
Age 26 to 35	0.0363***	0.0314***	0.0204***	0.0499***	0.0286***	0.0256***	0.0162**	0.0432***	0.0718***	0.0666***	0.0528***	0.0897***
	(0.00820)	(0.00763)	(0.00771)	(0.0146)	(0.00698)	(0.00660)	(0.00639)	(0.0131)	(0.0172)	(0.0166)	(0.0193)	(0.0280)
Age 46 to 55	-0.00203	-0.00137	-0.00404	0.00789	-0.00345	-0.00276	-0.00491	0.00568	-0.00529	-0.00280	-0.0102	0.0159
	(0.00627)	(0.00604)	(0.00587)	(0.0116)	(0.00516)	(0.00504)	(0.00457)	(0.0102)	(0.0137)	(0.0137)	(0.0149)	(0.0246)
Age 56 to 64	-0.0131*	-0.0118*	-0.0190***	0.00473	-0.00971*	-0.00890	-0.0140***	0.00521	-0.0226	-0.0201	-0.0395***	0.0136
	(0.00703)	(0.00675)	(0.00543)	(0.0146)	(0.00590)	(0.00576)	(0.00435)	(0.0129)	(0.0163)	(0.0162)	(0.0145)	(0.0314)
Education (ln)	0.0567***	0.0541***	0.0484***	0.0451**	0.0463***	0.0446***	0.0350***	0.0429**	0.0841***	0.0831***	0.0758**	0.0699*
	(0.0121)	(0.0115)	(0.0120)	(0.0201)	(0.0101)	(0.00970)	(0.00965)	(0.0176)	(0.0262)	(0.0256)	(0.0295)	(0.0422)
Lack of Financial Support	-0.000201	-0.00367	-0.00675	-0.00189	0.000671	-0.00173	-0.00442	-0.000813	0.00579	-0.000407	-0.0152	0.00587
	(0.00512)	(0.00480)	(0.00500)	(0.00857)	(0.00423)	(0.00404)	(0.00396)	(0.00744)	(0.0111)	(0.0109)	(0.0124)	(0.0179)
Administrative Burdens	-0.00708	-0.00949*	-0.00405	-0.0151*	-0.00395	-0.00596	-0.00248	-0.00978	-0.0175	-0.0227**	-0.0147	-0.0282
	(0.00543)	(0.00505)	(0.00557)	(0.00857)	(0.00457)	(0.00430)	(0.00441)	(0.00760)	(0.0116)	(0.0112)	(0.0130)	(0.0184)
Lack of Information	0.0137*	0.0108*	-0.00104	0.0318**	0.00857	0.00714	-0.00155	0.0253**	0.0229	0.0195	0.00168	0.0523**
	(0.00701)	(0.00651)	(0.00617)	(0.0130)	(0.00565)	(0.00535)	(0.00473)	(0.0113)	(0.0142)	(0.0137)	(0.0148)	(0.0249)
Occupation	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes**
	72.02	70.45	59.15	36.93	60.39	59.22	50.66	36.57	39.31	37.55	37.92	24.74
Area	Yes***	Yes***	Yes**	Yes***	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**	Yes	Yes*
	13.99	14.68	8.65	10.71	6.63	7.43	6.15	6.42	6.47	6.83	4.20	5.12
Country	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
	206.44	209.74	125.38	106.73	169.04	174.45	113.78	88.85	127.86	130.30	76.01	84.97
Observations	8176	8176	4755	3354	8176	8176	4755	3354	3643	3643	1946	1623
Pseudo-R² (Mc Fadden)	0.1289	0.1467	0.1706	0.1490	0.1896	0.2003	0.2309	0.1984	0.1180	0.1313	0.1748	0.1316

Notes. Probit estimation reporting marginal effects on the probability to be nascent entrepreneur. Regression analysis is conducted for the employable population. Self-employed are excluded. Denmark has to be excluded from analyses (176 observations, 80male and 95 female). Regressions (c) and (d) are based on the subsamples of women and men. For the sample of women, we had to exclude additionally Malta from analysis of female nascent entrepreneurship (68observations). In regression (3), the sample is restricted to individuals who state a preference for self-employment. Reference *IEA category*: score of 8 to 20; reference income-satisfaction: moderate; reference age: age group 36 to45 reference occupation: blue collar manual worker; reference area: rural zone; reference country: USA. Robust standard errors in parentheses., *** p<0.01, ** p<0.05, * p<0.1

Table 7: Non-linear Decomposition of the Gender Gap in Latent and Nascent Entrepreneurship – The Contribution from Gender Differences in Competitiveness and Risk Tolerance

| VARIABLES	Latent Entrepreneurship		Nascent Entrepreneurship among the Employable Population		
	Employable Population+*	Employees+	all	including Preference	Preference =1
Rate of Latent resp. Nascent Entrepreneurship, Men	0.4145	0.4073	0.0812	0.0812	0.1391
Rate of Latent resp. Nascent Entrepreneurship, Women	0.3374	0.3333	0.0519	0.0519	0.1023
Difference	0.0771	0.0740	0.0294	0.0294	0.0367
Characteristics Effect (Contribution from Gender Difference in all Variables)	0.0130	0.0113	0.0162	0.0222	0.0233
	16.85%	15.22%	55.15%	75.41%	63.40%
Contribution from Gender Difference in *Competitiveness*	0.00497**	0.00559**	0.00385***	0.00296***	0.00510***
	6.45%	*7.55%*	*13.10%*	*10.07%*	*13.90%*
Contribution from Gender Difference in *Risk Tolerance*	0.00698***	0.00752***	0.00220***	0.00143**	0.00237*
	9.05%	*10.16%*	*7.48%*	*4.86%*	*6.46%*
Contribution from Gender Difference in the other *six Personality Traits*	0.00102*	0.00129*	0.00129**	0.00107**	0.00148*
	1.32%	*1.74%*	*4.39%*	*3.64%*	*4.03%*
Contribution from Gender Differences in *Control Variables*	4.24e-06	-0.00307	0.00891***	0.0167***	0.0143***
	0.00%	*-4.15%*	*30.31%*	*56.80%*	*38.96%*

Notes. The Table shows the gender difference in latent and nascent entrepreneurship and the part of the gender gap that is explained by gender differences in all variables of the model (characteristics effect). In addition, the single contributions from gender differences in competitiveness, risk tolerance and the other six personality traits as well as in control variables are displayed. To calculate the coefficients, the pooled sample is used. To calculate the mean value of estimates from separate decompositions 1000 random subsamples of women are used. +Individuals who have ever started a business or are currently taking steps to start one are excluded. *We exclude individuals looking after the home from decomposition analysis of latent entrepreneurship among the employable population, since results are strongly affected by a small number of observations: about 850 women but only 27 men state that they are currently looking after the home. The non-linear decomposition analyses are conducted by using the Stata program implemented by Jann (2006).

Table 8: Non-linear Decomposition of the Gender Gap in Latent and Nascent Entrepreneurship – The Joint Contribution from Gender Difference in *IEA*

| VARIABLES	Latent Entrepreneurship		Nascent Entrepreneurship among the Employable Population		
	Employable Population+*	Employees+	all	including Preference	Preference =1
Rate of Latent resp. Nascent Entrepreneurship, Men	0.4145	0.4073	0.0812	0.0812	0.1391
Rate of Latent resp. Nascent Entrepreneurship, Women	0.3374	0.3333	0.0519	0.0519	0.1023
Difference	0.0771	0.0740	0.0294	0.0294	0.0367
characteristics effect (Contribution from gender difference in all variables)	0.0073	0.0050	0.0147	0.0214	0.0226
	9.46%	*6.82%*	*50.08%*	*72.63%*	*61.60%*
Contribution from gender difference in *IEA*	0.00637***	0.00696***	0.00553***	0.00435***	0.00790***
	8.26%	9.41%	18.81%	14.80%	21.52%

Notes. The Table shows the gender difference in latent and nascent entrepreneurship and the part of the gender gap that is explained by gender differences in all variables of the model (characteristics effect). In addition, contributions from gender differences in *IEA* and in control variables are displayed separately. To calculate the coefficients, the pooled sample is used for coefficients. To calculate the mean value of estimates from separate decompositions 1000 random subsamples of women are used. +Individuals who have ever started a business or are currently taking steps to start one are excluded. *We exclude individuals looking after the home from decomposition analysis of latent entrepreneurship among the employable population, since results are strongly affected by a small number of observations: about 850 women but only 27 men state that they are currently looking after the home. The non-linear decomposition analyses are conducted by using the Stata program implemented by Jann (2006).

Figure 1: Share of Top-Scorers in Competitiveness, Risk Tolerance and the other six Personality Traits
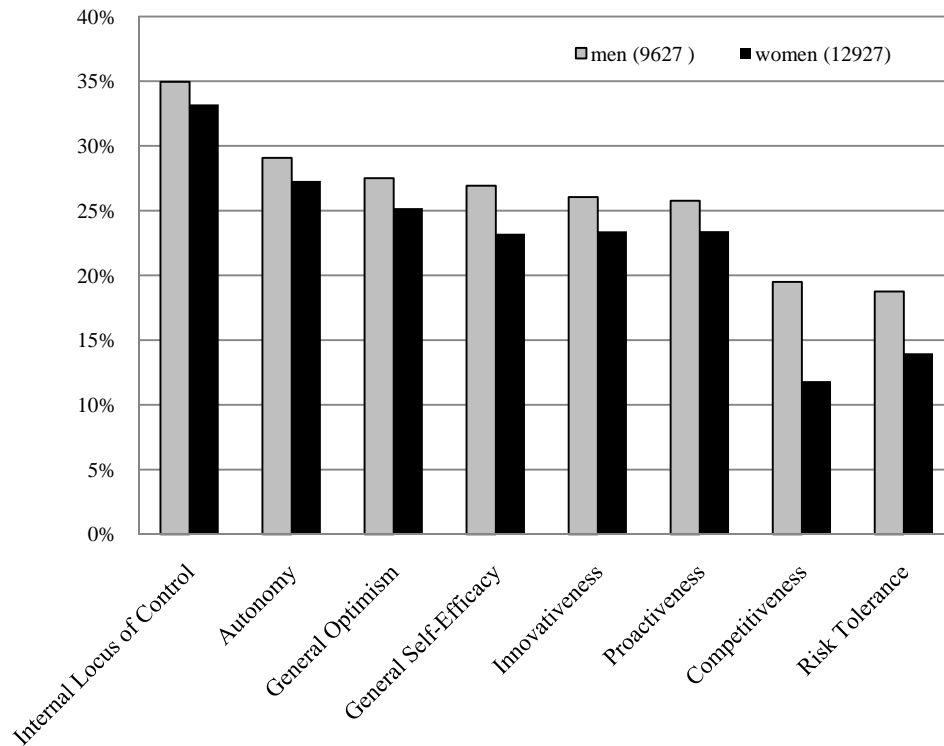
Notes: The Figure is based on a sample of 22554 observations, 9627 men and 12927 women as the maximum number of individuals who answered to all items of the *IEA* measure. Top-scores are defined as those individuals who strongly agree with the statement. Source: Flash EB *Entrepreneurship* 2009.

Figure 2: Distribution of *IEA* scores of Women and Men
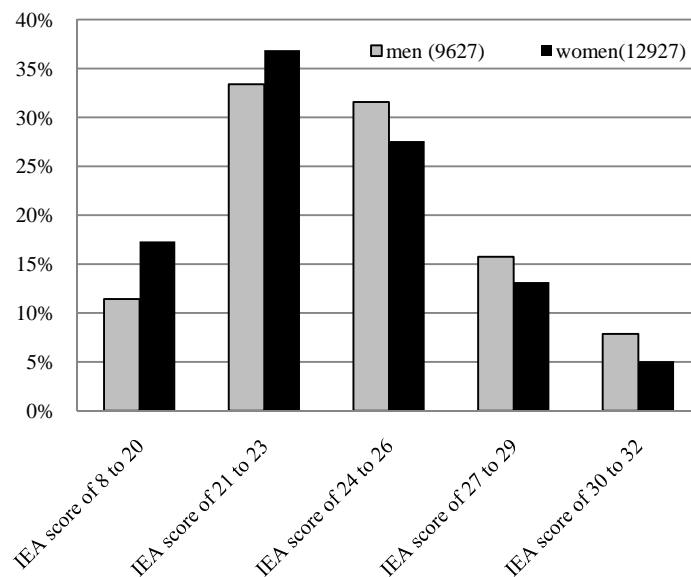
Notes: The Figure shows the distribution of *IEA* divided into five categories. *IEA* is formed by eight personality traits that are typically matched to the tasks of entrepreneurs. The sample comprises 22554 observations, 9627 men and 12927 women as the maximum number of individuals who answered to all eight items of the *IEA* measure. Source: Flash EB *Entrepreneurship* 2009.