The age distribution of commercial versus non-commercial entrepreneurs

Brigitte Hoogendoorn
Jan de Kok
Ute Stephan
Lorraine Uhlane
Peter van der Zwan

Zoetermeer, December 2014
The age distribution of commercial versus non-commercial entrepreneurs

Brigitte Hoogendoorn\textsuperscript{a}, Jan de Kok\textsuperscript{b}, Ute Stephan\textsuperscript{c}, Lorraine Uhlaner\textsuperscript{d}, Peter van der Zwan\textsuperscript{a}

\textsuperscript{a} Erasmus School of Economics, Erasmus University Rotterdam
\textsuperscript{b} Panteia
\textsuperscript{c} University of Sheffield
\textsuperscript{d} EDHEC Business School

\textbf{Abstract:} Entrepreneurs may differ in the extent to which they strive for commercial and non-commercial (social and environmental) goals. In this study we distinguish commercial entrepreneurship from non-commercial entrepreneurship, and examine if the relationship between age and entrepreneurship is different for these different types of entrepreneurship. Using data from the Global Entrepreneurship Monitor 2009, we find that the age distribution of non-commercial entrepreneurs is different from the age distribution of commercial entrepreneurs: the age distribution of non-commercial entrepreneurs is shifted to the right and the average age of non-commercial entrepreneurs is higher than the average age of commercial entrepreneurs. We formulate a framework for future research to further investigate the relationship between age and entrepreneurship for different types of entrepreneurship: is age a determinant of the choice to become a (non-commercial) entrepreneur, and if so why this is the case.

\textbf{Correspondence:} Correspondence can be addressed to Brigitte Hoogendoorn, Department of Applied Economics, Erasmus School of Economics, Erasmus University Rotterdam, Rotterdam 3000 DR, The Netherlands, bhoogendoorn@ese.eur.nl, tel.: +31104089525, fax: +31104089141.

\textbf{Acknowledgements:} The research has been supported by the framework of the research program SCALES, carried out by Panteia/EIM and financed by the Dutch Ministry of Economic Affairs.
1. Introduction

Entrepreneurship is recognized as an important source of growth. Originally, attention for entrepreneurship within economics focused on financial motives of entrepreneurs and the contribution of entrepreneurship to economic growth. Later, entrepreneurship research acknowledged that entrepreneurs can also have non-financial motives (e.g. social and environmental motives) and that, therefore, entrepreneurship can also contribute to social and environmental growth (and other non-economic dimensions of growth). From a policy perspective, this makes it relevant to know who becomes a social or environmental entrepreneur, why, and when (at what age). Several studies have examined the ‘who’ and the ‘why’, but little is known about the ‘when’.

The decision to become an entrepreneur is influenced by a combination of environmental factors (e.g., sector, region, business cycle) and individual characteristics. Individual characteristics that have been taken into account in previous research include previous labor market status, risk attitude, attitudes towards entrepreneurship, human and social capital, available financial capital, health status and demographic factors such as gender, ethnic background, household composition and age (Bates, 1995; Beugelsdijk and Noorderhaven, 2005; Davidsson and Honig, 2003; Dunn and Holtz-Eakin, 2000; Hout and Rosen, 2000; Thurik et al., 2008).

Studies that include age as determinant of entrepreneurship generally find support for the presence of a relationship between age and entrepreneurship (Bönte et al., 2007, p. 2). Mostly, these studies tend to treat entrepreneurship as a homogeneous phenomenon: a person is either an entrepreneur or not, independent of how entrepreneurship is defined. Some studies differentiate between different types of entrepreneurship. For example, Estrin et al. (2013) differentiate between commercial and social entrepreneurship. They present results separately for both types of entrepreneurship but do not appear to test formally whether the relationship between age and entrepreneurship is different for these different types of entrepreneurship.

In this study we distinguish commercial entrepreneurship from non-commercial entrepreneurship, where non-commercial entrepreneurship is defined as entrepreneurial behavior of people who have relatively much attention for social and/or environmental goals. Our objective is to examine if the relationship between age and entrepreneurship is different for these different types of entrepreneurship and why this may be the case.

To start with the latter, we will first examine previous literature on the subject of age and (non-commercial) entrepreneurship. Next, we will use data from the Global Entrepreneurship Monitor (2009) (GEM) to examine the age distribution of non-commercial entrepreneurs and determine whether it is different from the age distribution of commercial entrepreneurs, using different definitions of non-commercial entrepreneurship. In the final chapter we will formulate a framework for future research: we derive three hypotheses and suggest a methodological approach for testing these hypotheses.

It is customary to define entrepreneurs either as persons that exhibit entrepreneurial behavior (in particular, starting an enterprise) or as persons that own and/or manage an enterprise. Common indicators for entrepreneurial behavior are nascent entrepreneurship, new entrepreneurs (owning and managing a business that exists not more than 3.5 years) and total entrepreneurial activity (TEA), which is the sum of nascent and new entrepreneurship. This paper focuses on entrepreneurial behavior and uses TEA as an indicator.
2. Previous research

The relation between age and entrepreneurship

Many empirical studies into determinants of entrepreneurship include age of the entrepreneur as one of their control variables (De Kok et al., 2010; Georgellis et al., 2005; Lin et al., 2000). This is partly for pragmatic reasons (age is relatively easy to establish, so this information is often available) but also because age is believed to be an indicator of several important but not-so-easy to measure variables, such as experience, objectives, innovativeness, motivation etc. One could even argue that any relationship between age and entrepreneurship is likely to be an indirect one, where age affects characteristics such as health status, availability of financial capital, relevant experience, start-up motives and goals. These characteristics may, in turn, affect decisions by the (nascent) entrepreneur. Alternatively, age may act as a moderator for these characteristics. In general, however, these indirect effects of age are not examined empirically.

Most studies that include age as determinant of entrepreneurship find an inverse u-shaped relationship between age and entrepreneurial behavior (Bönte et al., 2007, p. 2): the probability that a person is busy starting a new enterprise and/or recently started a new enterprise first increases with age until it reaches a maximum, after which it decreases with age. The specific age (group) at which this maximum occurs varies however between studies. For example, Delmar and Davidsson (2000) find that in 1998, the nascent entrepreneurship rate in Sweden was highest for the age group 25 - 30. Using a European sample, Millán (2008) finds that the probability of entering self-employment is highest around the age of 35. This applies to entering self-employment from paid work as well as entering self-employment from unemployment. Van Stel et al. (2014) find a similar result for a sample of developed economies, where the TEA rate is highest amongst people aged 25 to 45 (Van Stel et al., page 24). Within this broad age group, the TEA rate is comparable for the age groups 25 – 34 and 35 – 44.

In their analysis of the transition to self-employment in Britain, Georgellis et al. (2005) find that the age effect (the effect of age on the probability of this transition, in a model that controls for other variables as well) is the highest for people aged 48. In Canada, however, the age effects is the highest for the youngest age group (15-24), after which the age effect decreases monotonically with age (Lin et al., 2000).

In sum, when entrepreneurship is defined as entrepreneurial behaviour (in particular the process of starting and managing a new enterprise), the conclusion seems to be that entrepreneurship is most prevalent amongst people aged 25 to 45. Entrepreneurship is least prevalent amongst the youngest and oldest age groups within the labor force. It is argued that middle-aged individuals have considerable advantages over younger individuals (i.e., business experience, access to capital, personal funding, social capital) and older individuals (i.e. commitment, drive, energy, and lower opportunity costs) when starting or owning/managing a business.

Only a few studies explicitly examine the relationship between age, strategy and motivation of entrepreneurs. De Kok, Ichou and Verheul (2010) find that entrepreneurs who start at older age are less likely to work fulltime in their new venture, are less willing to take risks and have a lower perception of their entrepreneurial skills. Ruis and Scholman (2012) examine a sample of more than 1,600 Dutch business owners and find various differences between business owners of different ages, but these differences are mostly relatively small and do not seem to follow a specific pattern. Regarding the main objective of the

---

1 Countries for which GDP/capita ≥ US$ 17.000
entrepreneur, they find that continuity is the most important objective for all age cohorts (other objectives are growth, independence and making profit), but that the likelihood of reporting ‘continuity’ as the most important objective increases with age. Achieving growth is only indicated as most important objective by a relatively small group of entrepreneurs, and they find no support for the presence of a relationship with age. Regarding the competitive strategy, they find that younger entrepreneurs more often pursue an innovation or marketing strategy, while older entrepreneurs more often tend to practice a price discounting strategy.

**Firm survival**

There are indications that age is not only related to the choice to start a new enterprise, but also to the probability of firm exit. Lin et al. (2000) find that younger people are not only more likely to enter into self-employment, but also to exit self-employment (controlling for the age of the enterprise). This is one of their explanations for the fact that business ownership is higher for elder age groups, even though startup rates are lower.

**Occupational choice and the role of age**

A basic assumption in entrepreneurship research is that individuals make their occupational decision on the basis of expected utility of the available (selected) alternatives (Cowling et al., 2004; Parker, 2006; Van Praag and Cramer, 2001). For example, Cowling et al. (2004) present a formal model where a risk-neutral individual is faced with the choice between three labor market positions: paid employment, solo self-employment or job-creating self-employment. This model assumes a single simultaneous decision-making process, where the individual compares expected utility from each activity. The model is based on the assumption that utility is a positive function of net income earned from each of the competing activities. This narrows the utility maximizing down to income maximization. This model also assumes that risk attitude is constant (in particular, independent of age). Age only enters the model as a proxy for a person’s human capital. Whereas this approach may be relevant for commercial entrepreneurs, it is not clear whether it will be suitable to analyze the decision of non-commercial entrepreneurs.

The model presented by Van Praag and Cramer (2001) is more flexible, in that it allows the risk attitude to vary between individuals. A person’s risk attitude thus becomes one of the determinants of the occupational choice of individuals. However, an individual’s risk attitude is still constant over time, and utility is a function of only income (either wages or expected profits) and age is not included as a determinant.

The life-cycle course effect stems from occupational choice theory and suggests that occupational preferences may change during one’s lifetime (Levesque and Minniti, 2006). Levesque and Minniti (2006) assume a negative relationship between age and entrepreneurial attitude. Their basic idea is that a wage job renders immediate pay-off while entrepreneurship is an investment in future earnings. The expectation of collecting future payments from starting a business decreases as one gets older and the subjective discount rate attached to future earnings increases (time gets scarcer). Here Levesque and Minniti (2006) refer to Becker’s theory on time allocation. In addition, the opportunity costs of starting a business increases over one’s life span (wage income increases). Hence according to Levesque and Minniti, this results in a negative relationship between age and entrepreneurial attitude. In addition, Parker’s neoclassical life-cycle theory of social entrepreneurship (2008) stems from this same strand although with an emphasis on utility instead of income. Next to income,
social entrepreneurial effort may render utility in terms of satisfaction from work itself or of ‘warm glow’ or the benefits this work yields to others.

In addition to economic theory, life course theory and theories on volunteering activities may also be a useful perspective. According to life course theory, individuals pass through “a universal developmental sequence through-out the human life cycle (childhood, adolescence, early adulthood, middle adulthood, and old age). As people age, they become more collectivistic, conservative, and self-transcendent, and less individualistic, open to change, and self-enhancing” (Egri and Ralston, 2004).

One of the aspects of the ageing process is that the focus on opportunities tends to decrease with age (Gielnik et al., 2012). “The concept of focus on opportunities captures how many new goals, plans, options, and opportunities people believe to have in their personal future (…). Research showed that the decrease in focus on opportunities accounts, among other factors, for changes in individuals' goals and motives as well as for lower performance” (Gielnik et al., 2012).

Another relevant aspect is that as time horizons shrink, people become increasingly selective, investing greater resources in emotionally meaningful goals and activities. This theory also assumes a shift in the types of goals that people pursue from knowledge-related goals aiming to acquire knowledge to emotion-related goals. “Fung, Carstensen, and Lang (2001) contend that the salience of social goals related to knowledge seeking such as striving for achievement in educational and occupational domains and comparing oneself to others decreases across adulthood, whereas the salience of social goals related to emotional gratification such as efforts to derive emotional meaning from life and to strengthen lose social ties increase with age.” (Okun & Schultz, 2003).

Empirical findings on age and social entrepreneurship

Estrin et al. (2013) examine different determinants of entrepreneurship, for different types of entrepreneurship (including commercial and social entrepreneurship). Using GEM 2009 data on social entrepreneurship, they find that the conventional inverted U-shaped relationship between age and entrepreneurship not only applies to commercial entrepreneurship, but also to social entrepreneurship. Although they do not test whether the strength of this relationship is the same for both types of entrepreneurship, it clearly rejects the hypotheses of a U-shaped age distribution for social entrepreneurship.

Whereas Estrin et al. (2013) compare different types of entrepreneurs with a reference group of individuals not engaged with entrepreneurial activities, Hoogendoorn et al. (2013) focus on entrepreneurs. They examine the importance of addressing unmet social and ecological needs in the decision to start a business. Using Eurobarometer data on entrepreneurship, they found a U-shaped relationship between age and the importance of unmet social and ecological needs (Hoogendoorn, Van der Zwan and Thurik, 2013). This indicates that entrepreneurs at different age have different objectives when starting an enterprise, and that social and environmental objectives are more important for middle-aged people as compared to younger or older people.
3. Methodology

Using GEM data to identify entrepreneurs

To examine the age distributions of commercial and non-commercial entrepreneurship, we use data from the Global Entrepreneurship Monitor (GEM) adult population survey. GEM is a research program that is executed annually with the aim to obtain internationally comparative high quality data on entrepreneurial activity. As of 1999, telephone or door-to-door surveys on entrepreneurial activity have been conducted annually with a random sample of at least 2,000 adults in each participating economy.

In 2009, the GEM included additional questions on social entrepreneurship. For this reason, we use data from 2009 for our study. In that year, the GEM covered 54 countries in which more than 180,000 interviews were conducted between May and October. 49 of the participating countries included the additional questions on social entrepreneurship in their survey (Bosma and Levie, 2010).

One of the main indicators on entrepreneurship provided by the GEM is total early-stage entrepreneurial activity or TEA. TEA indicates whether an individual is classified as a nascent entrepreneur (someone actively involved in setting up a business they will own or co-own; this business has not paid salaries, wages, or any other payments to the owners for more than three months) or as a new business owner (someone who is currently an owner-manager of a new business, i.e., owning and managing a running business that has paid salaries, wages, or any other payments to the owners for more than three months, but not more than 42 months). We use this indicator as our measure of entrepreneurship and restrict our analyses to the adult population (age restricted to 18 years and older and younger than 65).

Commercial and non-commercial entrepreneurship

The GEM 2009 survey includes two different questions that can be used to distinguish between commercial and non-commercial entrepreneurs. The first question is used to identify self-proclaimed social entrepreneurs: “Are you, alone or with others, currently trying to start or currently owning and managing any kind of activity, organization or initiative that has a particularly social, environmental or community objective?”. This question is asked to all participants, irrespective of their answers to the general questions on entrepreneurship. In theory, it is therefore possible that an individual who does not consider herself to be a nascent entrepreneur or a new business owner (and hence, according to the TEA criterion, not an entrepreneur) can be a self-proclaimed social entrepreneur. This scenario indeed occurs, on more than one occasion. If we would use this question, we should compare the age distribution of the following three groups of entrepreneurs:

- Commercial entrepreneurs: entrepreneurs (according to the TEA criterion) that are not self-proclaimed social entrepreneurs.
- Social entrepreneurs: entrepreneurs (according to the TEA criterion) that are self-proclaimed social entrepreneurs.
- Social non-entrepreneurs: self-proclaimed social entrepreneurs that do not meet the TEA-criterion of entrepreneurship.

A disadvantage of this classification is that the difference between social entrepreneurs and social non-entrepreneurs is not clear: it is not clear why some self-proclaimed social entrepreneurs consider themselves as early-stage entrepreneur (nascent entrepreneur or a new
business owner), while others do not. We therefore prefer to use another question to identify commercial and non-commercial entrepreneurs. This is a question that is only asked to respondents that are identified as early-stage entrepreneurs, and asks them to allocate a total of 100 points across three categories as it pertains to their goals: economic, social and environmental.

Since points can be allocated to three different objectives, we could differentiate between the following four groups:

- Commercial early-stage entrepreneurship: those early-stage entrepreneurs that allocate more than 50 points to commercial goals.
- Social early-stage entrepreneurship: those early-stage entrepreneurs that allocate more than 50 points to social goals.
- Environmental entrepreneurship: those early-stage entrepreneurs that allocate more than 50 points to environmental goals.
- Other: those early-stage entrepreneurs that do not have one specific category to which they allocate more than 50 points.

This classification is theoretically appealing: an entrepreneur is only considered to be a commercial, social or environmental entrepreneur if that specific goal is dominant (in the sense that it accounts for more than 50% of the points to be allocated). Unfortunately, this classification has a serious drawback, in that the distribution is skewed. In particular, the group of social early-stage entrepreneurs is very small, making it different to compare them with the other groups (and, also, making one wonder about the relevance of studying such a small subpopulation).

For now, we have therefore decided to combine the points for social and environmental goals and define non-commercial entrepreneurs as those entrepreneurs for which the points for social and environmental goals are at least equal to a certain cut-off point\(^2\). By using different cut-off points, we obtain different definitions of non-commercial entrepreneurship. In the next section we present graphs of the age distribution for commercial and non-commercial entrepreneurs using different definitions (cut-off points).

To test whether age distributions are different for commercial and non-commercial entrepreneurs, we use a nonparametric test. A standard test to compare distributions is the two-sample Kolmogorov-Smirnov test. A disadvantage of this test is that it does not perform well if the variable of interest is not continuous but interval, where specific values of y occur multiple times (in one or both samples). Since our age variable is defined in terms of years (rather than date of birth), it is in fact interval data. We therefore prefer the Mann–Whitney U test\(^3\), since this test can control for the presence of ties. In addition, we use the chi-square test to determine whether the mean age is different for different types of entrepreneurship.

---

\(^2\) For example, for a cut-off point of 50, an entrepreneur is considered to be a non-commercial entrepreneur if the total number of points allocated to social and environmental goals is 50 or more.

\(^3\) Also known as Mann–Whitney–Wilcoxon, Wilcoxon rank-sum test, or Wilcoxon–Mann–Whitney test.
4. Comparing the age distribution for different types of entrepreneurship

Different definitions of non-commercial entrepreneurship

We have used five different cut-off points, resulting in five different definitions of non-commercial entrepreneurship: non-commercial entrepreneurs are defined as entrepreneurs allocating at least 50 points (Figure 1), 60 points (Figure 2), 70 points (Figure 3), 75 points (Figure 4) or 80 points (Figure 5) to social and/or environmental goals. Each of the associated figures compares the age distribution of the non-commercial entrepreneurs with the other (commercial) entrepreneurs and reports several statistics.

Independent of which cut-off point is applied, the figures show that the age distribution of non-commercial entrepreneurs is shifted to the right somewhat as compared to the age distribution of the other (commercial) entrepreneurs. The Mann-Whitney U-tests confirm that the age distribution of non-commercial entrepreneurs is different from the age distribution of the commercial entrepreneurs, and the average age increases with the cut-off point used: entrepreneurs that allocate not more than 50 points to social and environmental goals are on average 36.8 years old, while the average age of the non-commercial entrepreneurs increases from 37.8 (for the 50 cut-off point) to 38.0 (for the 60 and 70 cut-off point), 38.5 (for the 75 cut-off point) and 39.2 years old (for the 80 cut-off point).

Figure 1 Commercial versus non-commercial entrepreneurship with cut-off at 50 points

<table>
<thead>
<tr>
<th></th>
<th>Commercial enterprise</th>
<th>Non-commercial enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(sb no)</td>
<td>(sb yes)</td>
</tr>
<tr>
<td>Frequency</td>
<td>8.489</td>
<td>2.443</td>
</tr>
<tr>
<td>Average age</td>
<td>36.8</td>
<td>37.8</td>
</tr>
<tr>
<td>Test statistic</td>
<td>-4.046</td>
<td>0.000</td>
</tr>
<tr>
<td>p-value</td>
<td>0.014</td>
<td></td>
</tr>
</tbody>
</table>

Source: GEM 2009
Figure 2 Commercial versus non-commercial entrepreneurship with cut-off at 60 points

<table>
<thead>
<tr>
<th></th>
<th>Commercial enterprise (SB no)</th>
<th>Non-commercial enterprise (sb yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>9.365</td>
<td>1.562</td>
</tr>
<tr>
<td>Average age</td>
<td>36.8</td>
<td>38.0</td>
</tr>
<tr>
<td>Chi-square</td>
<td>53.41</td>
<td>0.211</td>
</tr>
<tr>
<td>Test statistic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source: GEM 2009</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3 Commercial versus non-commercial entrepreneurship with cut-off at 70 points

<table>
<thead>
<tr>
<th></th>
<th>Commercial enterprise (SB no)</th>
<th>Non-commercial enterprise (sb yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>10.150</td>
<td>771</td>
</tr>
<tr>
<td>Average age</td>
<td>36.9</td>
<td>38.0</td>
</tr>
<tr>
<td>Mann–Whitney U</td>
<td>-2.420</td>
<td>0.015</td>
</tr>
<tr>
<td>Chi-square</td>
<td>52.24</td>
<td>0.24</td>
</tr>
<tr>
<td>Source: GEM 2009</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 4 Commercial versus non-commercial entrepreneurship with cut-off at 75 points

<table>
<thead>
<tr>
<th></th>
<th>Commercial enterprise (SB no)</th>
<th>Non-commercial enterprise (sb yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>10.278</td>
<td>642</td>
</tr>
<tr>
<td>Average age</td>
<td>36.9</td>
<td>38.5</td>
</tr>
</tbody>
</table>

Test statistic

- Mann–Whitney U: -3.297, p-value: 0.001
- Chi-square: 64.66, p-value: 0.036

Source: GEM 2009

Figure 5 Commercial versus non-commercial entrepreneurship with cut-off at 80 points

<table>
<thead>
<tr>
<th></th>
<th>Commercial enterprise (SB no)</th>
<th>Non-commercial enterprise (sb yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>10.571</td>
<td>343</td>
</tr>
<tr>
<td>Average age</td>
<td>36.9</td>
<td>39.2</td>
</tr>
</tbody>
</table>

Test statistic

- Mann–Whitney U: -3.453, p-value: 0.001
- Chi-square: 68.18, p-value: 0.018

Source: GEM 2009
As figures 1 to 5 clearly show, the shape of the age distribution is also different for non-commercial entrepreneurs as compared to commercial entrepreneurs. The age distribution of entrepreneurs that allocate not more than 50 points to social and environmental goals has the well-known shape where the density first increases rapidly to reach a maximum at a certain age (in this case, somewhat less than 30 years), after which it slowly but monotonically decreases. The age distribution of commercial entrepreneurs shows different shapes, where the shape depends on the cut-off point used, but there is a tendency for the distribution to be bimodal, which is most clearly at the cut-off points of 50, 70 and 75.

**Comparing three types of entrepreneurship**

Since the definition of commercial entrepreneurs is linked to the definition of non-commercial entrepreneurs, each of the figures 1 to 5 compares the age distribution of non-commercial entrepreneurs to a different reference group. In the case of Figure 5, the reference group of commercial entrepreneurs includes 86% of the group of non-commercial entrepreneurs from Figure 1. We therefore also include Figure 6 which compares the age distribution of three different types of entrepreneurship:

- Commercial early-stage entrepreneurship (CE): those early-stage entrepreneurs that allocate less than 33 points to social and environmental goals.
- Non-commercial early-stage entrepreneurship (SE): those early-stage entrepreneurs that allocate more than 66 points to social and environmental goals.
- In-between early-stage entrepreneurship (IE): those early-stage entrepreneurs that allocate from 33 to 66 points to social and environmental goals.

Figure 6 confirms that the age distribution of the non-commercial entrepreneurs is different from the age distribution of commercial entrepreneurs. In addition, it should be noticed that neither of the three age distributions presented in this figure is bimodal.
The age distribution of (non-commercial) entrepreneurship should not be confused with the (non-commercial) entrepreneurship rate by age (which share of a specific age group is made up of entrepreneurs, for different age groups). Whereas the former is only concerned with the age of entrepreneurs, the latter is concerned with the question whether people are more likely to become a (non-commercial) entrepreneur at particular points in their lives. Especially if the age distribution of a country’s workforce is skewed, these two types of analysis may result in different findings. For example, if a large share of the workforce consists of young people, the age distribution of non-commercial entrepreneurs may show that the largest share of non-commercial entrepreneurs is young, while the non-commercial entrepreneurship rate by age may indicate that non-commercial entrepreneurship rates are highest amongst elder people.
5. A framework for future research

Our empirical findings show that the age distribution of non-commercial entrepreneurs is different from the age distribution of commercial entrepreneurs. The direction of the difference is as expected: the age distribution of non-commercial entrepreneurs is shifted to the right and the average age of non-commercial entrepreneurs is higher than the average age of commercial entrepreneurs.

It is, however, unlikely that this relationship between age and the choice for a specific type of entrepreneurship is a direct causal relationship. Age is often interpreted as an indicator of personal characteristics for which no data is available, such as experience, objectives, innovativeness, motivation etc. The relationship between age and entrepreneurship is therefore likely to be indirect, where either the effect of age on entrepreneurship may be mediated by other variables (e.g., age affects experience, which in turn affects entrepreneurial behavior), or age may moderate the effects of other variables on entrepreneurial behavior.

Hypotheses

We propose to further investigate the relationship between age and entrepreneurship for different types of entrepreneurship: is age a determinant of the choice to become a (non-commercial) entrepreneur, and if so why this is the case. Based on our findings so far, we posit the following hypotheses:

H1: The relationship between age and the choice for non-commercial entrepreneurship is different than the relationship between age and the choice for commercial entrepreneurship.

H2: The relationship between age and the choice for entrepreneurship is mediated by personal characteristics such as available resources (education, household income, social networks) and personal characteristics (opportunity recognition, risk aversion, self-efficacy).

H3: Age moderates the relationship between personal characteristics such as available resources (education, household income, social networks) and personal characteristics (opportunity recognition, risk aversion, self-efficacy), and the choice for entrepreneurship.

Methodology

These hypotheses involve a comparison between the following three groups of individuals:

- Commercial early-stage entrepreneurship
- Non-commercial early-stage entrepreneurship
- Employees not involved in entrepreneurial behavior

The group of employees will be the default group to which the other groups can be compared. We propose to classify all entrepreneurs into three groups (commercial, non-commercial and in-between) and to exclude the in-between group from the analyses. This will increase the contrast between the commercial and non-commercial entrepreneurs.

To test these hypotheses, we can either estimate two binary logistic models (one comparing commercial entrepreneurs to employees, and one comparing non-commercial entrepreneurs to employees) or a single multinomial logistic regression. As a robustness
check, we can also include the group of in-between entrepreneurs in our models and determine to which extent this affects the parameter estimates for the commercial and non-commercial entrepreneurship.

The first hypothesis can be tested by estimating a model along the lines of the basic framework presented in Figure 7. This framework includes only a limited number of control variables, in order to capture the ‘full’ relationship between age and entrepreneurial behavior. Hypothesis H1 can be tested by comparing whether the parameters for age for commercial entrepreneurship (vis-à-vis employees) and non-commercial entrepreneurship (vis-à-vis employees) are significantly different from each other.

To determine the presence of mediating variables (the second hypothesis), the basic model can be extended with potential mediators (and possibly moderators) (see Figure 8), after which a comparison should be made with the age parameters from the basic model. In addition, we have to establish whether age is related to these mediating variables. This can be done by estimating regression models where the mediating variables are included as dependent variable.

**Figure 7 Basic framework**

![Figure 7 Basic framework](image)

**Figure 8 Extended framework**

![Figure 8 Extended framework](image)

*Control for country differences*

The GEM dataset includes observations from almost 50 different countries, which show a large variance in entrepreneurial behavior, age structure of the workforce, and many other relevant characteristics. Future research should control for these country differences, for example by estimating the models in a multi-level framework that includes various indicators capturing cultural and institutional factors.
References


Estrin, S., T. Mickiewicz and U. Stephan, 2013, Entrepreneurship, social capital and institutions: social and commercial entrepreneurship across nations, *Entrepreneurship Theory and Practice* 37(3), 479-504


The results of Panteia Research Programme on SMEs and Entrepreneurship are published in the following series: Research Reports and Publieksrapportages. The most recent publications of both series may be downloaded at: www.entrepreneurship-sme.eu.

### Recent Research Reports and Scales Papers

**H201411** 18-12-2014 The impact of the 2008 financial crisis on European enterprises: the role of innovation systems

**H201409** 27-11-2014 Ageing and entrepreneurship across Dutch regions

**H201408** 11-11-2014 Emerging industries! Connected Health, Local Exchange Trading Systems and Flexible Office Spaces

**H201407** 14-10-2014 Global Entrepreneurship Monitor The Netherlands 2013

**H201406** 20-05-2014 Twee mythes over ondernemerschap ontrafeld

**H201405** 11-06-2014 What drives environmental practices of SMEs?

**H201404** 25-04-2014 Bank loan application success by SMEs: the role of ownership structure and innovation

**H201403** 20-05-2014 The Emperical Scope of User Innovation

**H201402** 03-04-2014 Scale effects in workplace innovations

**H201401** 20-03-2014 Verklaringen van de overlevingskans van bedrijven, gestart door allochtone ondernemers

**H201314** 27-11-2013 Global Entrepreneurship Monitor The Netherlands 2012

**H201313** 25-10-2013 Emerging industries! Challenges in alternative dance, tracking devices and fast casual dining

**H201312** 25-10-2013 FAMOS 2013 a Size-Class based Financial Analysis Model

**H201311** 7-08-2013 A Cumulative Production Structure Matrix for Dutch SMEs

**H201310** 4-07-2013 Belemmeringen, informele samenwerking en MKB-bedrijfsgroei

**H201309** 4-06-2013 Start-up motivation and (in) voluntary exit

**H201308** 30-05-2013 Explaining entrepreneurial performance of solo self-employed from a motivational perspective

**H201307** 23-04-2013 Entrepreneurial activity, industry orientation, and economic growth

**H201306** 18-04-2013 Self-employment and Job Generation in Metropolitan Areas, 1969-2009

**H201305** 7-03-2013 The impact of the economic crisis on European SMEs

**H201304** 4-03-2013 Learning from Entrepreneurial Projects: A Typology

**H201303** 3-04-2013 Wat drijft ondernemers om maatschappelijke vraagstukken op te pakken? (Nederlandse samenvatting)

**H201302** 17-04-2013 Unraveling the relationship between the business cycle and the own-account worker’s decision to hire employees

**H201301** 01-02-2013 Entrepreneurship education and self-employment: the role of perceived barriers

**H201219** 14-01-2013 Firm resources, dynamic capabilities, and the early growth of firms

**H201218** 12-02-2014 The relationship between entrepreneurial activity the business cycle and economic openness

**H201217** 17-12-2012 The Environmental Regulation Paradox for Clean Tech Ventures
<table>
<thead>
<tr>
<th>Date</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>H201216</td>
<td>How does employment protection legislation influence hiring and firing decisions by the smallest firms?</td>
</tr>
<tr>
<td>H201215</td>
<td>The Production Structure of Small, Medium-sized and Large enterprises in Dutch Private Enterprise - Analysis by economic sector</td>
</tr>
<tr>
<td>H201214</td>
<td>The Production Structure of Small, Medium-sized and Large enterprises in Dutch Private Enterprise - Analysis at the aggregate level</td>
</tr>
<tr>
<td>H201213</td>
<td>Institutions and the allocation of entrepreneurship across new and established organizations</td>
</tr>
<tr>
<td>H201212</td>
<td>Solo self-employed versus employer entrepreneurs: prevalence, determinants and macro-economic impact</td>
</tr>
<tr>
<td>H201211</td>
<td>Disentangling the effects of organizational capabilities, innovation and firm size on SME sales growth</td>
</tr>
<tr>
<td>H201210</td>
<td>Do firm size and firm age affect employee remuneration in Dutch SMEs?</td>
</tr>
<tr>
<td>H201209</td>
<td>The risk of growing fast: Does fast growth have a negative impact on the survival rates of firms?</td>
</tr>
<tr>
<td>H201208</td>
<td>Investigating the impact of the technological environment on survival chances of employer entrepreneurs</td>
</tr>
<tr>
<td>H201207</td>
<td>Start-Up Size Strategy and Risk Management: Impact on New Venture Performance</td>
</tr>
<tr>
<td>H201206</td>
<td>Ageing and entrepreneurship</td>
</tr>
<tr>
<td>H201205</td>
<td>Innoveren in het consumentgerichte bedrijfsleven</td>
</tr>
<tr>
<td>H201204</td>
<td>Time series for main variables on the performance of Dutch SMEs</td>
</tr>
<tr>
<td>H201203</td>
<td>Do small business create more jobs? New evidence for Europe</td>
</tr>
<tr>
<td>H201202</td>
<td>Trends in entrepreneurial Activity in Central and East European Transition Economies</td>
</tr>
<tr>
<td>H201201</td>
<td>Globalization, entrepreneurship and the region</td>
</tr>
<tr>
<td>H201119</td>
<td>The risk of growing fast</td>
</tr>
<tr>
<td>H201118</td>
<td>Beyond Size: Predicting engagement in environmental management practices of Dutch SMEs</td>
</tr>
<tr>
<td>H201116</td>
<td>Entrepreneurial exits, ability and engagement across countries in different stages of development</td>
</tr>
<tr>
<td>H201115</td>
<td>Innovation barriers for small biotech, ICT and clean tech firms: Coping with knowledge leakage and legitimacy deficits</td>
</tr>
<tr>
<td>H201114</td>
<td>A conceptual overview of what we know about social entrepreneurship</td>
</tr>
<tr>
<td>H201113</td>
<td>Unraveling the Shift to the Entrepreneurial Economy</td>
</tr>
<tr>
<td>H201112</td>
<td>Bedrijfscriminaliteit</td>
</tr>
<tr>
<td>H201111</td>
<td>The networks of the solo self-employed and their success</td>
</tr>
<tr>
<td>H201110</td>
<td>Social and commercial entrepreneurship: Exploring individual and organizational characteristics</td>
</tr>
<tr>
<td>H201109</td>
<td>Unraveling the relationship between firm size and economic development: The roles of embodied and disembodied technological progress</td>
</tr>
<tr>
<td>H201108</td>
<td>Corporate Entrepreneurship at the Individual Level: Measurement and Determinants</td>
</tr>
</tbody>
</table>