



# Economic preferences and temperament traits among business leaders and paid employees

Mikko Vaaramo · Leena Ala-Mursula ·  
Jouko Miettunen · Marko Korhonen 

Accepted: 12 June 2022 / Published online: 11 July 2022  
© The Author(s) 2022

**Abstract** This paper explores individuals' economic preferences and temperament traits among different categories of business leaders (i.e., managers, self-employed with employees, self-employed without employees) and paid employees. We assume that these quite stable preferences and traits play a role in predicting occupational choice toward leadership roles. We use a large individual-level survey dataset (n = 5890) from the Northern Finland Birth Cohort 1966 at age 46 with linkages to nationally registered data. We construct survey measures for three types of economic preferences: risk, time, and social preferences. We use Cloninger's inventory to measure four main temperament traits: harm avoidance, reward dependence, novelty-seeking, and persistence. We show that business leaders, in general, have different economic preferences and temperament traits than

paid employees. To become a manager, especially the temperament trait of novelty-seeking seems relevant; and to become self-employed, particularly the economic preference of risk-taking appears as important.

**Plain English Summary** In middle-aged population, business leaders are more prone to novelty-seeking and persistence than paid employees, and self-employed individuals without employees score highest in risk taking.

**Keywords** Business leaders · Temperament traits · Cloninger · Economic preferences

**JEL Classification** C91 · D91 · J62

---

**Supplementary information** The online version contains supplementary material available at <https://doi.org/10.1007/s11187-022-00653-2>.

---

M. Vaaramo · M. Korhonen (✉)  
Department of Economics, University of Oulu, P.O.  
Box 4600, N90014 Oulu, Finland  
e-mail: marko.korhonen@oulu.fi

L. Ala-Mursula · J. Miettunen  
Center for Life Course Health Research, University  
of Oulu, P.O. Box 5000, N90014 Oulu, Finland

J. Miettunen  
Medical Research Center Oulu, Oulu University Hospital,  
University of Oulu, Oulu, Finland

## 1 Introduction

Economic preferences (risk, time, and social preferences) play an important role in economic outcomes (e.g., Dohmen et al., 2011; Falk et al., 2018; and Becker et al., 2020) and especially in occupational choice models (e.g., Kihlstrom & Laffont, 1979; Stewart & Roth, 2001; Holm et al., 2013; and Koudstaal et al., 2016). For example, people who are more risk tolerant are more likely to become entrepreneurs or self-employed than paid employees (e.g., Kihlstrom & Laffont, 1979; Van Praag & Cramer, 2001; Puri & Robinson, 2005; and Åstebro et al.,

2014). In an important contribution, Falk et al. (2018) experimentally validate survey data from 80,000 people in 76 countries and show that economic preferences are closely linked to labor market choices. In line with this, Bönthe and Piegeler (2013) show that willingness to take risks is related to both latent and nascent entrepreneurship. Furthermore, Holm et al. (2013) and Koudstaal et al. (2016) show that there are differences between managers, entrepreneurs, and paid employees with regard to economic preferences, especially in terms of risk tolerance.

Recent occupational choice models increasingly recognize the roles of both economic preferences and personality traits in labor market outcomes (e.g., Borghans et al., 2008; and Becker et al., 2012).<sup>1</sup> In their meta-analyses, Rauch and Frese (2007) and Zhao et al. (2010) argue that personality variables should be taken into account to develop a consistent theory of entrepreneurship. Zhao et al. (2010) also show that risk propensity as a separate dimension of personality was positively associated to entrepreneurial intentions. Caliendo et al. (2014) explore how different kinds of personality characteristics are associated with entrepreneurial development. They show that especially higher levels of risk attitudes and an internal locus of control have strong effects on entry into entrepreneurship. They further present that individuals' own Big 5 personality traits (openness, conscientiousness, extraversion, agreeableness, and neuroticism) are more important determinants of entrepreneurship than parental self-employment. Hamilton et al. (2019) construct a structural model of entry into self-employment linking nonpecuniary benefits of self-employment and personality traits. They show that the personality traits that drive entry to self-employment are not necessarily the same traits that make entrepreneurship profitable. Nevertheless, in line with Caliendo et al. (2014), they show that extraversion and openness predict higher rates of self-employment. Regarding comparisons between different types of leaders, Zhao and Seibert (2006) show that there exist significant differences between entrepreneurs and managers' personality dimensions. Pekkala-Kerr et al. (2019) quantify the Big 5 personality traits and risk tolerances among

entrepreneurs and their venture team members in settings where they are working together. They find that entrepreneurs show more openness and self-efficacy and less neuroticism than do employees in the same companies.

In their review, Golsteyn and Shildberg-Horisch (2017) specify that economic preferences and personality traits are related concepts characterizing individual decision-making across variety of domains. Both are considered relatively stable traits. Not only personality traits but also economic preferences have been shown to be at least partly heritable and thus potentially even biologically rooted (e.g. Black et al., 2017; and Frey et al., 2017). Frey et al (2017) show that risk preference encompasses both a general attitudinal and a domain-specific behavioral component. Becker et al. (2012) and Heckman et al. (2021) investigate the extent to which economic preferences and personality traits are related. The main conclusion is that the two concepts are complementary when explaining heterogeneity in human behavior.

To date, the Big 5 model of personality traits has dominated the conceptualizations of personality in economics research (Borghans et al., 2008; and Almlund et al., 2011). However, Paunonen and Ashton (2001) among others present that personality variables do exist outside of Big 5 domains and can be independent from the Big 5 traits. Feher and Vernon (2021) argue that Cloninger's psychobiological model of personality might have predictive advantages over the Big 5 model, although the models also have been shown to significantly overlap (e.g. De Fruyt et al., 2000; and Capanna et al., 2012). Nevertheless, Cloninger's model (1986) builds on distinguishing between the dimensions of temperament and character. The Cloninger temperament traits<sup>2</sup> represent the biologically rooted foundations of personality and can be studied in distinct dimensions. While Cloninger's model has been considerably used in psychological and psychiatric research, there has been much lesser use in economics research. To our knowledge, this is the first study to explore both economic preferences and Cloninger's temperament traits in understanding

<sup>1</sup> An excellent review for personality traits and risk attitudes of entrepreneurship is Pekkala-Kerr et al. (2018).

<sup>2</sup> Temperament is the biologically rooted foundation of a personality which appears early in life and represents a quite stable trait during the life course. Temperament describes the way in which an individual acts and reacts in relation to environmental stimuli and interacts with others.

occupational choice to business leaders and paid employees.

The specific aims of this study are to explore how the distinct and combined economic preferences and temperament traits (i.) correlate and (ii.) differ across middle-aged paid employees, managers, self-employed individuals with employees and self-employed individuals without employees. As supplemental analysis, we compare the categories regarding balances of multiple preferences and traits. While some evidence of the effects of these preferences and traits already exists in different occupations, their distinct effects across different types of leadership roles are poorly understood. We assume to find differences in these traits across these positions. Furthermore, building on earlier evidence on the relative stability of these traits during the life course, we aim to shed light on the individual origins of occupational choices towards leadership positions. This allows us to answer the question of which preferences and traits, if any, might separate managers from the self-employed; it also allows us to find possible similarities across these leadership categories.

The novelty of our study is based on providing distinct measures of economic preferences (EP) and temperament traits (TTs) from the Temperament and Character Inventory (TCI). We measure three types of economic preferences (risk, time, social) using data from self-reported preferences and hypothetical experimental survey instruments. We use two measures for risk preference: (1) a standard survey questionnaire related to general attitudes toward risk-taking; and (2) a hypothetical experiment on an individual's choice between a risky or a certain salary. For the time preference, we use a hypothetical experiment that explores whether an individual is willing to wait to obtain a higher amount of money. We measure social preference with the question of whether an individual can trust others.

Our measure for temperament traits is based on Cloninger's psychobiological theory, including the traits of harm avoidance, novelty-seeking, reward dependence, and persistence (Cloninger, 1986, 1987). The strength in Cloninger's temperament traits in relation to occupational choice studies is that these traits are thought to be heritable, rather stable and are associated with activity (Cloninger, 1986). This means that a person's traits would not markedly

change due to occupational changes, earnings success or failure, and other real-life changes.

While the main focus of this paper is on economic preferences and temperament traits, we are also able to include several other important explanatory factors in our analysis. The personal meanings assigned to work and having an active coping strategy are shown to be important factors for occupational choice (e.g., Shir et al., 2019). In addition, optimism and overconfidence are shown to be important predictors of leadership positions, despite the fact that earnings are subject to greater risk than are occupations in positions with less responsibility (Moskowitz & Vissing-Jørgensen, 2002; and Hsieh et al., 2017). However, measures of overconfidence and optimism are confusingly conflicted in the literature (e.g., Parker, 2018). Therefore, we use separate measures for optimism and overconfidence. Further covariates include important human capital variables (education level, work experience, and job tenure) and several background variables (gender, height, urban origin, losing a parent by age 14, having a self-employed parent, having a high grade-point-average in theoretical subjects after elementary school at age 16, and being married or cohabiting at age 46).

We utilize data from the Northern Finland Birth Cohort 1966 (NFBC 1966), which is a non-selective, prospective, general population-based birth cohort that has been followed since mid-pregnancy. Furthermore, the NFBC 1966 dataset is linked with a wide array of highly reliable data from the national registers. The cohort is based on 12,058 live-born children. Based on a 2012 survey, the NFBC 1966 dataset allows us to explore individuals' economic preferences and temperament heterogeneity effects in a large sample that includes managers ( $n=246$ ), self-employed persons without employees ( $n=512$ ), self-employed with employees ( $n=60$ ) and paid employees ( $n=5072$ ).

We proceed by firstly analyzing how economic preferences and temperament traits are correlated, and secondly analyzing how they differ by leadership category. We find that preferences and traits are distinct dimensions with only small intercorrelations. We show how managers and self-employed differ from paid employees in terms of their economic preferences and temperament traits. Our evidence suggests that economic preferences and temperament traits determine occupational choice in various

leadership positions. We find that high novelty-seeking is the most important single temperament trait for an individual that has achieved a managerial position. For self-employment, the most important single contributor is the economic preference of risk-taking. In supplemental analyses, we additionally find that managers present with relatively favorable scores in all temperament scores, and that self-employed individuals without employees have high levels of all risk preferences.

The rest of the article proceeds as follows. Section 2 describes the data measurements. Section 3 presents the descriptive statistics. In Sect. 4, we present our results. In Sect. 5, we discuss our findings, and Sect. 6 concludes.

## 2 Measurement and sampling

### 2.1 The NFBC 1966 data

We use data from the NFBC 1966 Birth Cohort (University of Oulu, 1966). The NFBC 1966 dataset includes all babies born in the provinces of Oulu and Lapland with an expected due date in 1966. These two provinces make up approximately 50% of the land area of Finland and cover roughly 14% of the 1966 population. In the cohort, a total of 12,058 babies were live-born, 6169 of whom were boys and 5889 were girls, presenting over 95% of all children born in the area in 1966. The NFBC 1966 dataset has since been gathered through clinical examinations, postal questionnaires, various hospital records and national register data. The dataset contains details on an extremely rich set of variables that capture almost all of the factors needed to analyze the occupational outcomes for this birth cohort. The cohort members represent all sectors of national economy and occupations. In the supplementary information, we present the composition of occupations and industries for our survey members (see Figure S1 in supplementary information). Since 1966, there has been migration within the country, especially towards southern Finland (Nordström et al., 2021), but the regional gap in GDP per capita has remained relatively stable. According to OECD Regional database, Finland has the second smallest regional economic disparities among OECD countries (OECD, 2020).

The study was conducted in accordance with the World Medical Association Declaration of Helsinki and, in 2011, it was approved by the Ethics Committee of the Northern Ostrobothnia Hospital District (#91/2011). Much of our analysis focuses on the 46-year follow-up study, where the survey data were collected in 2012. Postal questionnaires were sent to all 10,321 participants with known addresses (response rate 67%,  $n=6851$ ). These questionnaires included items on health, health behavior, social background, various resources, economic preferences and temperament traits, and work-related factors. We also utilized some background data from the pregnancy questionnaire from 1965 and from the 14-year follow-up study from the year 1980. The survey data were linked with the register datasets from the Finnish National Agency for Education, the Finnish Tax Administration and Statistics Finland. All participants gave their written informed consent to use their data for scientific purposes and to be combined with the registers.

### 2.2 Definitions of managers, the self-employed without employees, the self-employed with employees, and paid employees

Data related to the leadership category was obtained from Statistics Finland's Classification of Occupation and Socioeconomic group registers. We define managers as persons who work at various levels in companies or public sector organizations and hold manifold executive positions and are responsible for subordinates. Our definition follows ISCO-08 classification for managers. Their tasks involve planning, organizing, coordinating, and reviewing various operations, among other activities. We define self-employment without employees as an occupational choice where one works for oneself on one's own account and takes risks to create business opportunities in a relatively small-sized firm (Hébert & Link, 1988 and Gorgievski & Stephan, 2016). Our definition of self-employed without employees includes only people who have no hired employees under their control. Self-employed with employees are those classified as being self-employed and also as employing subordinates over which they have a leadership role and carry out managerial duties. Employees are people who are employed by other entities and do not belong to the other three employment categories.

We exclude from the dataset the self-employed individuals from agriculture, forestry or fishery industries. In addition, the unemployed, students and those on disability pensions are also excluded.

## 2.3 Economic preferences

### 2.3.1 Risk preferences

The NFBC 1966 survey measures risk preferences in two ways, both of which have a precedent in the literature. The first measure is based on a typical self-rating question (scaled 0–10): “Describe your attitude toward risk-taking. Generally speaking, are you fully prepared to take risks, or do you prefer to avoid taking risks?” A response of 0 means that the individual is not at all ready to take risks and 10 means they are fully prepared to take risks. This question is also used in Dohmen et al. (2011). Based on the respondents’ answers, we divided the participants into five approximately equal sized groups, where the first group includes the least-willing risk-takers and group five includes the most-willing risk-takers.

The second risk-preference measure is the so-called risky salary question, where individuals’ risk aversion is based on their answer on the following three-step question on job choice. Picture yourself in the following situation: You are your household’s sole breadwinner, and you have to choose between two equally good jobs. In the Job A, which is safe, your monthly after-tax salary will be €2800 for the rest of your life. In the Job B, the risky one, you have a 50–50 chance of receiving a higher monthly after-tax salary for the rest of your life, and a 50–50 chance at receiving a lower monthly after-tax salary for the rest of your life. The uncertain options are 50/50 chances to receive either of the following: in step 1, either €5600 or €2240; in step 2, either €5600 or €2460; and in step 3, either €5600 or €1900.

Respondents must answer all 3 steps: They must accept or reject the gamble for the lower income in each level. The safer the choices one makes, the more risk-averse the individual is. We only include those respondents who answered all of the questions and whose answers are consistent.<sup>3</sup>

<sup>3</sup> Only 2% of the answers were inconsistent. The share of inconsistent answers was similar among employees (2.2%), managers (1.8%) and self-employed without employees (2.3%). Among self-employed with employees, there were no inconsistent answers.

The participants are then divided into four groups. Group 1 consists of participants who always chose a job with a certain salary and the group 4 consists of individuals who always chose a job with an uncertain salary. The risky salary is used in Barsky et al. (1997), Kimball et al. (2008), and Kapteyn and Teppa (2011) among others.

### 2.3.2 Time preference

The survey includes one measure for the time preference. It captures discount rates from a hypothetical experiment that explores whether the individual is more present- or future-oriented. The quantitative measure of patience is obtained by the respondents’ self-assignments regarding their willingness to wait before acquiring a particular amount of money 2 days from today to obtaining a higher amount of money 9 days from today. Individuals must choose whether they want €1000 after 2 days or a higher amount after 9 days. In total, there are 7 choices and the amount the participant can receive varies from €1012 to €1200. The variable count is the number of answers in alternative B. This question is also used in Ikeda et al. (2010).

### 2.3.3 Social preference (trust)

For the dimension of social preference, the survey has one measure (trust), which comes from the following survey question: “Generally speaking, do you feel you can trust people or do you need to use caution when dealing with people?” The scale is from 0 to 10, in which 0 means “Have to use extra caution” and 10 means “Most people can be trusted.” This is a commonly used self-reported question for social preferences and it is the same as the trust question, for example, in the European Social Survey.

## 2.4 Temperament traits

We use temperament traits (TT) from the Temperament and Character Inventory (TCI, version IX) of Cloninger et al. (1993), which are obtained from Cloninger’s (1987) original model. The survey’s measured temperament traits are as follows: (1) Novelty-seeking (NS) describes the tendency to respond with intense excitement to novel stimuli. A highly novelty-seeking individual has a tendency toward exploratory

activity and impulsive decision making, while those with low novelty-seeking are much more reserved. (2) Harm avoidance (HA) measures the tendency toward behavioral inhibitions when faced with potential danger or punishment. Being nervous or timid is an indicator of high harm avoidance, while being relaxed in potentially harmful situations is a sign of low harm avoidance. (3) Reward dependence (RD) implies a tendency to intensely respond to reward signals, especially to social rewards that come from other individuals. Persons with high reward dependence scores are often social and interactive with others, while those low in reward dependence often prefer to be alone. (4) Persistence (P) measures how hard and consistently an individual can push themselves to achieve goals.

#### 2.4.1 Cloninger's Temperament traits in relation to Big-5 taxonomy

There are two main theories of human personality: the Big-5 taxonomy (Costa & McCrae, 1992) and Cloninger's (1986) psychobiological theory. De Fruyt et al. (2000) and Capanna et al. (2012) show that there is considerable empirical overlap with Big-5 and Cloninger's scale ratings. They show that each Cloninger's temperament trait dimension is related to at least one of the dimensions in the Five Factor Model. Novelty-seeking is most strongly associated with extraversion, but also with openness to experience, and negatively with conscientiousness. Harm avoidance correlates positively with neuroticism and negatively with extraversion. Reward dependence is associated with extraversion, but also with openness to experience. Persistence has a positive association with conscientiousness.

## 2.5 Other traits and values

There are several measures for other psychological traits and work-related values. When we measure active coping strategies, we ask respondents to indicate how they cope with events that are difficult and stressful (Devonport & Lane, 2006; Shen, 2009; and Shir et al., 2019). We note that having tendency to use active coping strategies is closely related to having an internal locus of control, a variable that has been widely used in economics literature of entrepreneurship (e.g. Evans and Leighton, 1989). Our scale of

active coping strategies consists of four self-evaluation questions about the extent to which individuals believe that life events are within their control and they have the ability to solve problems. Our instrument indicates the extent that the respondents use active problem-focused coping strategies.

When we measure the personal meaning participants assign to work, we pose six questions related to their reasons for working, such as having a calling, a meaning in life, pursuing for mastery, or just making a living.

Overconfidence refers to the case where a decision maker is overly optimistic in their initial assessment of a situation. The concept of overconfidence includes the overestimation of one's actual performance, the high ranking of one's performance relative to the performance of others and one's beliefs in one's overprecision or excessive precision (Åstebro et al., 2014). Our survey question of overconfidence is based on Thaler's (2000) definition of overconfidence (see also Camerer & Lovallo, 1999; and Moore & Kim, 2003). We measure for overconfidence in the following survey question: "How good do you think you are at making financial decisions compared to other people?" The choice options are very poor, worse than average, better than average, and very good.

To measure optimism, we use the Life Orientation Test-Revised (LOT-R) 6-item scale, which is measured on a 5-point Likert scale, ranging from 0=strongly disagree to 4=strongly agree (Scheier et al., 1994). In these questions, individuals evaluate how optimistically they think about the future. For example, one question is stated as "Do the following statements apply to you: In times of uncertainty, I always expect the best." The answer includes five options: always, very often, somewhat often, not often and never.

## 2.6 Covariates

Information on the participants' level of educational attainment is obtained from the register of the Central Statistical Office of Finland. The educational categories (National Level of Education -classification) used in the analysis are defined according to each participant's lifetime highest level of educational achievement until they are 46 years of age. The following categories are used: less than upper secondary education, upper secondary education, short-cycle

tertiary education, a bachelor's or equivalent level of education and master's level or higher education. The cohort members' grade point average (GPA) for theoretical subjects is calculated at the time they leave school after having received a basic education at 15 to 16 years of age. The data for participants' GPAs are obtained from the central application register of the Finnish National Agency for Education. The register of the Finnish Tax Administration provides the 2012 taxable income of each of the cohort members. Participants' net wealth is self-reported from the 2012 survey.

The NFBC 1966 dataset also includes several socioeconomic and background covariates. Respondents were asked to report their employment-related roles during each year since they were 16 years old until they turned 45 years of age (annually from 1982 to 2012). We compute their employment experience by calculating the number of years the cohort member participated in the labor market since 1982. We also obtained information on the cohort members' current job statuses according to International Standard Classification of Occupations (ISCO) categories at the 5-digit level annually after 2004. We use this information to measure job tenure. We also know whether these individuals were born in urban or rural areas. In addition, the 2012 survey provides cohort members self-reported answers to the questions regarding their marital status and whether they are cohabiting vs. not cohabiting, the number of children living at home and the respondents' own heights in 2012.

### 3 Descriptive statistics

#### 3.1 Descriptive statistics

Table 1 shows the sample descriptive statistics ( $n=5890$ ). The sample comparison is between employees ( $n=5072$ ), the self-employed without employees ( $n=512$ ), managers ( $n=246$ ) and the self-employed with employees ( $n=60$ ). Table 1 shows us that there are more men than women among managers and the self-employed. Marriage rates are higher for managers and self-employed individuals with employees than for others. There is also a higher level of educational attainment among managers. Managers have higher GPAs in theoretical subjects than others do. In addition, managers are taller than the self-employed or paid employees. We also

see that managers' incomes are higher than the incomes of others and that the self-employed without employees have lower incomes than the control group of employees. Those who are self-employed with employees clearly have the highest capital income and net wealth. Further, individuals who are self-employed and do not have employees earn higher capital incomes and have the higher net wealth than paid employees do. These income-related findings are in line with the empirical observation that people enter into self-employment despite the high risk of earning low average returns (Åstebro et al., 2014). Also, the finding that net wealth is higher for the self-employed than for paid employees or managers is also in line with previous literature (Parker, 2018).

Education: 1=less than upper secondary education; 2=upper secondary education; 3=short-cycle tertiary education; 4=bachelors or equivalent level; and 5=master's level or higher.

The participation rates in the four different questionnaires in 46-year follow-up were approximately 60%. Overall, compared to drop-outs, the participants were more often employed, more educated, with higher SES, married and with children (Nordström et al (2021)). For this specific study, we present the drop-out analysis in the supplementary information. The comparison between participants and drop-outs can be found in Table S1.

#### 3.2 Economic preferences, temperament traits and occupations

Figure 1 shows how economic preferences (EP) and temperament traits (TCI) are compared between the four leadership categories of managers, the self-employed without employees, the self-employed with employees, and paid employees. Each preference and trait is normalized to have mean 0 and standard deviation 1 in individual-level data. For the risk preference, we use self-rating questions for attitudes toward risk. Figure 1 shows how the averages for each preference compare to the average values for the other categories. The figure shows that economic preferences and temperament traits for managers and the self-employed markedly differ relative to those of paid employees. For managers, the greatest differences in economic preferences relative to those of others appear in their social preference (trust). Risk and the time preference are relatively close to those of the self-employed but markedly differ from those

**Table 1** Characteristics of the study sample

	Employees	Managers	Self-employed without employees	Self-employed with employees
Female	58.3%	32.9% <sup>a</sup>	40.2% <sup>a, b</sup>	30% <sup>a</sup>
Married	62.3%	78.9% <sup>a</sup>	63.5% <sup>b</sup>	71.7%
Urban origin	30.2%	43.1% <sup>a</sup>	32.5% <sup>b</sup>	23.3% <sup>b</sup>
Lost parent by 14 years of age	6.5%	5.3%	6.3%	5%
Parent self-employed	26.3%	19.9% <sup>a</sup>	27.2% <sup>b</sup>	33.3% <sup>b</sup>
GPA in theoretical subjects (scale 4–10)	7.56	8.32 <sup>a</sup>	7.33 <sup>a, b</sup>	7.21 <sup>a, b</sup>
Height				
Females	165	167.6 <sup>a</sup>	165.2 <sup>b</sup>	164.2 <sup>b</sup>
Males	178.7	179.9 <sup>a</sup>	178.4 <sup>b</sup>	178.8
Work experience	20.27	20.46	21.64 <sup>a, b</sup>	21.65
Tenure in present job	5.76	4.93 <sup>a</sup>	5.30 <sup>a</sup>	4.23 <sup>a, c</sup>
Education level		<sup>a</sup>	<sup>a, b</sup>	<sup>a, b</sup>
1	3.9%	1.2%	7.6%	5%
2	42.6%	6.5%	53.5%	50%
3	23.0%	19.9%	20.5%	31.7%
4	12.8%	15.5%	6.1%	8.3%
5	17.7%	56.9%	12.3%	5%
Annual income (€, 2012 register dataset)				
Average	35,417	83,708 <sup>a</sup>	30,848 <sup>a, b</sup>	49,025 <sup>a, b, c</sup>
Median	31,733	71,109	26,535	39,356
Capital income (€, Register dataset for 2012)	640	6654 <sup>a</sup>	3405 <sup>a</sup>	23,922 <sup>a, b, c</sup>
Net wealth (€, self-reported in 2012)				
Average	197,324	372,186 <sup>a</sup>	399,461 <sup>a</sup>	577,431 <sup>a, b</sup>
Median	150,000	300,000	200,000	300,000
Observations:	5072	246	512	60

<sup>a</sup>Denotes that the value differs from employees at the 5% significance level.

<sup>b</sup>Denotes that the value differs from managers at the 5% significance level.

<sup>c</sup>Denotes that the value differs from the self-employed without employees at the 5% significance level.

of paid employees. For the self-employed, we see that among the self-employed with employees there is clearly a preference for higher risk compared to the self-employed without employees, but there are no differences in the time and social preferences among the self-employed with and without employees.

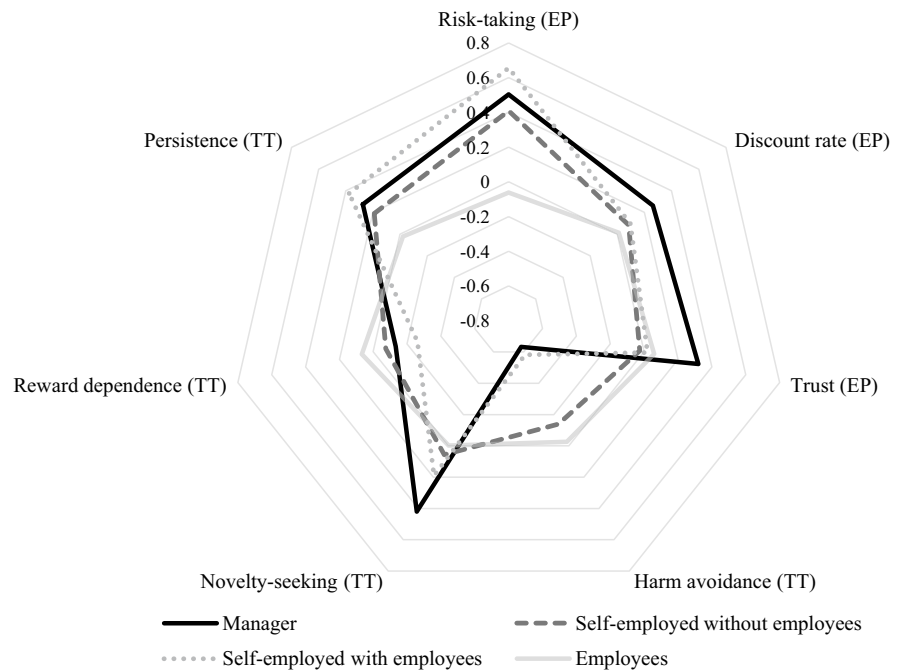
Regarding the temperament traits, we find markedly lower harm avoidance for managers and the self-employed with employees compared to the self-employed without employees or paid employees. Among managers, novelty-seeking is higher and reward dependence is lower than among the self-employed. For persistence, paid employees

have lower ratings than leaders overall but there are only small differences between managers and the self-employed.

Figure 1 reveals also some interesting findings related to the important question why some self-employed people seem to turn into employer. Caliendo et al. (2019) presents that some entrepreneurs decide not to have employees. The reasons might be that they are experimenting entrepreneurship, due to lack of capital or simply that they do not prefer to have employees. In Caliendo et al. (2009) they show that the individual's risk preference is a more elusive concept that it might initially seem. We can see from Fig. 1 that self-employed without



**Fig. 1** Economic preferences (EP) and temperament traits (TT): averages by employment type



employees score high in risk-taking but that their harm avoidance is close to that of paid employees.<sup>4</sup> This gives some evidence that the level of temperament of harm avoidance across self-employed might be one possible factor explaining self-employed turning into employers. Unfortunately, we are unable to differentiate the reasons behind the different types of self-employment. However, our evidence shows the importance to distinct risk preference from harm avoidance in analyzing self-employment (see also Ekelund et al., 2005 and Korhonen et al., 2020).

While Fig. 1 shows that economic preferences and temperament traits seem to differ across leadership categories, these preferences and traits might still be mutually correlated. Table 2 shows correlations between economic preferences and temperament traits, together with levels of significance.

We find some significant correlations across variables. For the entire study population, we find that risk-taking negatively correlates with harm avoidance and positively correlates with novelty-seeking and persistence. The discount rate correlates slightly negatively with novelty-seeking. Trust positively correlates with reward dependence and novelty-seeking and negatively with harm avoidance. We also find

some correlations across economic preferences, especially a negative correlation between risk-taking and trust. We also find some correlations across temperament traits, which is a typical finding in personality research (e.g., Becker et al., 2012). We see that harm avoidance, in particular, seems to correlate with other temperament traits. The significant correlations between economic preferences and temperament traits show that they are not totally independent of one another. However, all of these correlations are rather low ( $<0.30$ ), implying that our measures capture distinct features of economic preferences.

To explore the potential for economic preferences and temperament traits to capture similar attitudes across individuals, we present our correlation by isolating the self-employed and managers from employees. For managers, we find that risk-taking negatively correlates with harm avoidance and positively with novelty-seeking. The discount rate correlates positively with harm avoidance and negatively with novelty-seeking whereas trust correlates positively with reward dependence for managers. For managers, harm avoidance correlates with other temperament traits. There are relatively high negative correlations between harm avoidance and novelty-seeking and persistence among managers.

<sup>4</sup> The statistically significant differences can be found from Table 3.

**Table 2** Pairwise correlations

	Risk-taking	Discount rate	Trust	Harm avoidance	Novelty-seeking	Reward dependence	Persistence
<b>All</b>							
Risk-taking	1						
Discount rate	-0.024	1					
Trust	0.227*	0.060*	1				
Harm avoidance	-0.307*	0.016	-0.183*	1			
Novelty-seeking	0.304*	-0.061*	0.145*	-0.317*	1		
Reward dependence	-0.028	0.033*	0.245*	0.060*	0.168*	1	
Persistence	0.136*	-0.003	-0.048*	-0.212*	-0.059*	0.037*	1
<b>Managers</b>							
Risk-taking	1						
Discount rate	-0.058	1					
Trust	0.121	-0.051	1				
Harm avoidance	-0.199*	0.146*	-0.068	1			
Novelty-seeking	0.262*	-0.146*	0.106	-0.304*	1		
Reward dependence	-0.041	0.056	0.295*	0.182*	0.143*	1	
Persistence	0.127	0.046	-0.135	-0.356*	0.018	-0.112	1
<b>Self-employed without employees</b>							
Risk-taking	1						
Discount rate	-0.036	1					
Trust	0.237*	0.020	1				
Harm avoidance	-0.278*	0.061	-0.040	1			
Novelty-seeking	0.238*	-0.084	0.120*	-0.212*	1		
Reward dependence	-0.092	0.031	0.283*	0.087	0.176*	1	
Persistence	0.147*	0.006	-0.097	-0.194*	-0.092	0.020	1
<b>Self-employed with employees</b>							
Risk-taking	1						
Discount rate	0.084	1					
Trust	0.095	0.039	1				
Harm avoidance	-0.183	0.027	-0.177	1			
Novelty-seeking	0.033	-0.094	0.184	-0.391*	1		
Reward dependence	-0.142	0.047	-0.028	0.077	-0.045	1	
Persistence	0.367*	0.138	0.137	-0.260	-0.251	-0.049	1
<b>Paid employees</b>							
Risk-taking	1						
Discount rate	-0.033*	1					
Trust	0.234*	0.066*	1				
Harm avoidance	-0.300*	0.015	-0.196*	1			
Novelty-seeking	0.308*	-0.060*	0.145*	-0.318*	1		
Reward dependence	-0.009	0.035*	0.244*	0.045*	0.176*	1	
Persistence	0.117*	-0.011	-0.043*	-0.199*	-0.065*	0.052*	1

\* Significant in 5% significance level.

**Table 3** Statistics for economic preferences, temperament traits and other traits

	Employees	Managers	Self-employed without employees	Self-employed with employees
Economic preferences				
Risk-taking	-0.062	0.503 <sup>a</sup>	0.409 <sup>a</sup>	0.655 <sup>a, c</sup>
Risky salary	-0.068	0.795 <sup>a</sup>	0.460 <sup>a, b</sup>	0.777 <sup>a, c</sup>
Discount rate	0.012	0.263 <sup>a</sup>	0.085 <sup>b</sup>	0.096
Trust	0.059	0.321 <sup>a</sup>	-0.025 <sup>b</sup>	0.020 <sup>b</sup>
Temperament and character inventory				
Harm avoidance	-0.026	-0.632 <sup>a</sup>	-0.139 <sup>a, b</sup>	-0.582 <sup>a, c</sup>
Novelty-seeking	-0.002	0.420 <sup>a</sup>	0.056 <sup>b</sup>	0.191
Reward dependence	0.067	-0.133 <sup>a</sup>	-0.074 <sup>a</sup>	-0.261 <sup>a</sup>
Persistence	-0.021	0.274 <sup>a</sup>	0.190 <sup>a</sup>	0.376 <sup>a</sup>
Other personal traits and attitudes				
Personal meaning of work	-0.045	0.392 <sup>a</sup>	0.318 <sup>a</sup>	0.570 <sup>a, c</sup>
Active coping strategy	0.006	0.468 <sup>a</sup>	0.098 <sup>a, b</sup>	0.211 <sup>b</sup>
Optimism	0.031	0.523 <sup>a</sup>	0.146 <sup>a, b</sup>	0.334 <sup>a</sup>
Overconfidence	-0.030	0.658 <sup>a</sup>	0.215 <sup>a, b</sup>	0.512 <sup>a, c</sup>

Variables standardized, : mean 0, sd 1

<sup>a</sup>Denotes the value differs from employees at the 5% significance level.

<sup>b</sup>Denotes the values differ from managers at the 5% significance level.

<sup>c</sup>Denotes the values differ from the self-employed without employees at the 5% significance level.

For the self-employed without employees, risk-taking positively correlates with novelty-seeking and persistence and negatively with harm avoidance. There is no correlation between risk-taking and the discount rate and temperament traits, while trust correlates positively with novelty-seeking and reward dependence for the self-employed. There are fewer and lower correlations across temperament traits for the self-employed than for managers. We see that harm avoidance negatively correlates with novelty-seeking and persistence and that there is a positive correlation with novelty-seeking and reward dependence. Risk-taking correlates positively with trust.

For the self-employed with employees, risk-taking positively correlates with persistence. There are no correlations between either the discount rate or trust and other economic preferences or temperament traits. For temperament traits, there is only one statistically significant correlation, namely harm avoidance negatively correlates with novelty-seeking. For paid employees, the group that represents the majority of all participants, the correlations follow those of the whole sample. Overall, our correlation analysis shows that economic preferences and temperament traits seem to be rather distinct variables across leadership categories.

Table 3 shows the means of all of the measures for preferences, temperament traits, and other traits for each of the four categories of interest. All of the variables are standardized with mean 0 and variance 1. We can see that in all measures, managers rate themselves differently compared to paid employees. Managers are less risk-averse (for both measures), and more patient and trusting of other people than employees are. The self-employed differ from paid employees in both measures of risk preferences. However, there are no relevant differences in time discounting and trust among the self-employed and employees.

Table 3 also shows that the temperament traits of managers and the self-employed significantly differ from those of employees. Only for novelty-seeking is there no significant difference between the self-employed and paid employees. Leaders, managers, and the self-employed without employees differ in terms of their levels of harm avoidance and novelty-seeking but there are no differences in their reward dependence and persistence. For temperament traits, there are no statistical differences among managers and the self-employed with employees.

The attributes related to other personal traits and attitudes show that, in almost all traits, managers

and the self-employed differ from paid employees. Managers are more optimistic than the self-employed but there is no difference in overconfidence between managers and the self-employed with employees.

## 4 Results

### 4.1 Economic preferences, temperament traits and leadership categories

In this section, we estimate more specifically how economic preferences and temperament traits are related across the leadership categories. We estimate the following ordered probit regression model:

$$y^* = \beta * Occ + \theta * ECV + \delta * X + \epsilon \quad (1)$$

where  $y^*$  is latent unobserved measure for preferences and traits. The observed discrete variable  $y$  is determined as following:

$$y = j, \text{ if } \mu_{j-1} < y^* \leq \mu_j \quad (2)$$

and then probability that individual belongs to group  $j$  is

$$Pr(y = j) = Pr(\mu_{j-1} < y^* \leq \mu_j) = Pr(\mu_{j-1} < \beta * Occ + \theta * ECV + \delta * X + \epsilon \leq \mu_j) \quad (3)$$

We use managers, the self-employed without employees, and the self-employed with employees as indicator variables (*Occ*) and compare them to paid employees. For the economic covariate variables (*ECV*), we use registered taxable income, education level, and employment tenure. We are aware that a potential problem with these covariates is that they may affect economic preferences and personality traits in that these covariates might suffer endogeneity problem. These variables are, however, important determinants of economic decision-making, and it is crucial to include them in our regression. A similar approach is used, for example, in Dohmen et al. (2011). We also include in our regressions “non-economic” covariates ( $X$ ), such as gender, marital status, an urban origin dummy, a parents’ self-employment dummy and a dummy for whether one or both parents died before the cohort member was 14 years old. In addition, the GPA from comprehensive school at age 16 and the

individual’s height in adulthood are included in our analysis. In choosing the covariates, we follow previous literature, especially Dohmen et al. (2011) and Koudstaal et al. (2016). Since our main focus is on economic preferences and temperament traits, we do not present all of the estimated parameters; they can be found in the supplementary information (Tables S3 and S4). In the supplementary information, we also present the marginal effects (Tables S7 and S8). For robustness, all of the estimations are also done without covariates, as presented in the supplementary information (see Tables S5 and S6 in the supplementary information). We also present the full correlation matrix among all covariates in the supplementary information (Table S2). All correlations are rather low, so we think that multicollinearity is not a problem in our analysis.

Figure 2 provides the estimates related to economic preferences. We find that leaders have significantly higher risk-taking traits and riskier salary preferences than the reference group of paid employees. There are no significant differences between the self-employed and managers for any risk-preference measures. For the time preference, the only leadership category whose economic preferences differ from paid employees is the self-employed without employees. However, there are no differences between the lead-

ership categories of managers and the self-employed with and without employees. For the social preference, we find that managers display the highest level of trust relative to others and significantly higher trust than paid employees. Trust among the self-employed does not differ from that of paid employees.

Figure 3 presents the estimates related to temperament traits. Overall, we can see that managers and the self-employed differ from paid employees in levels of harm avoidance and persistence. Managers have lower harm avoidance and higher persistence. For novelty-seeking, we find that managers and the self-employed without employees have significantly higher levels than paid employees do. For the harm avoidance trait, there is also a significant difference between managers and the self-employed without employees. Novelty-seeking is higher for managers than for the self-employed but the difference is not significant. Also, there is no statistically significant



Fig. 2 Economic preferences, reference group: paid employees



Fig. 3 Temperament traits, reference group: paid employees

difference in novelty-seeking between paid employees and the self-employed with employees. For the reward dependence trait, there is no difference across categories. The persistence trait is higher for the self-employed with employees but there are no statistically significant differences among managers and the self-employed.

#### 4.2 Occupational choice

We start by estimating our multinomial logistic occupational choice model as follows:

$$Pr(y = j|EP, TT, PTA, X) = \frac{\exp(\alpha_j + \beta_j*EP + \gamma_j*TT + \theta_j*PTA + \mu_j*X)}{\sum_{j=1}^4 \exp(\alpha_j + \beta_j*EP + \gamma_j*TT + \theta_j*PTA + \mu_j*X)}, j = 1, \dots, 4 \quad (4)$$

and relative risk ratio is

$$\frac{Pr(y = j)}{Pr(y = 1)} = \exp(\alpha_j + \beta_j*EP + \gamma_j*TT + \theta_j*PTA + \mu_j*X), j = 2, \dots, 4 \quad (5)$$

Table 4 reports the relative risk ratios from a multinomial logistic regression model for occupational choices (j) toward leadership among managers, self-employed without employees, and self-employed with employees, compared to employees. As main explanatory variables, we include the three types of economic preferences (EP) and four dimensions of temperament traits (TT). We also include in our regression variables for other personal traits and attitudes (PTA). These variables are presented in Sect. 2. Further, as our background variables (X), we use gender, height, educational level, urban origin, parent(s) being dead before the cohort member was 14 years old, parents' self-employment, own marital status at age 46, work experience, and job tenure. These variables are also presented and discussed in Sect. 2.

We can see that some of the economic preferences and temperament traits seem to affect occupational choices. In particular, the economic preference of risk-taking and the temperament trait of novelty-seeking seem to have an important effect on occupational choices toward any type of leadership. For economic preferences, the results show that less risk-averse individuals are more likely to be self-employed than managers or employees. Social preference; i.e., trust, seems to significantly decrease the probability of individuals ending up in self-employment without employees. Trust slightly increases the probability of attaining

managerial positions. Time discounting has a minor non-significant association with leadership positions.

For temperament traits, we find probabilities favoring managerial positions only. Lower harm avoidance and especially higher novelty-seeking seem to be related to choices toward being a manager. For the self-employed with employees, no significant associations with temperament traits are found. Reward dependence seems to have a minor negative association with the probability of being a manager and persistence seems to have some positive association with the probability of being a manager or self-employed

without employees.

Regarding other traits and attitudes, we see that an active coping strategy seems to be an important determinant for ending up in a managerial position. Likewise, assigning a high meaning to work seems important for having chosen self-employment. Overconfidence is significant for both being a manager and self-employed with employees. Higher education positively predicts holding a managerial position and negatively being self-employed without employees. For managers, other important factors are height and tenure. For the self-employed without employees, being male and having longer work experience are important and for the self-employed with employees, parents' self-employment is a significant factor.

#### 4.3 Combinations of risk preferences and temperament traits

Borrowing from Lazear's balanced skills model (2005), we explore whether there are differences in the balance between economic preferences and temperament traits across leadership positions. One might argue that economic preferences and temperament traits might be complementary in a way that, for some leadership positions, people would need to have reasonably high levels of multiple economic preferences and/or temperament traits. This argument is closely related to Lazear's model (2005), which points to the fact that entrepreneurship requires high expertise in a variety of skills, whereas employees can be specialists.

**Table 4** Occupational choice (Multinomial logistic regression, relative risk ratio)

Variables	(1)			(2)			(3)		
	Managers	Self-employed without employees	Self-employed with employees	Managers	Self-employed without employees	Self-employed with employees	Managers	Self-employed without employees	Self-employed with employees
Risk-taking	1.337** (0.123)	1.754*** (0.119)	2.434*** (0.520)	1.276* (0.124)	1.684*** (0.118)	2.080*** (0.453)	1.209 (0.128)	1.581*** (0.120)	1.956** (0.469)
Discount rate	1.309** (0.113)	1.087 (0.064)	1.205 (0.210)	1.085 (0.100)	1.170* (0.072)	1.213 (0.217)	1.024 (0.101)	1.113 (0.074)	1.216 (0.236)
Trust	1.258* (0.127)	0.824** (0.051)	0.822 (0.144)	1.107 (0.115)	0.867* (0.056)	0.908 (0.167)	1.111 (0.125)	0.848* (0.060)	0.971 (0.196)
Harm avoidance	0.586*** (0.063)	1.029 (0.0685)	0.637* (0.138)	0.654*** (0.074)	1.065 (0.073)	0.689 (0.152)	0.798 (0.105)	1.060 (0.087)	0.851 (0.218)
Novelty-seeking	1.276** (0.111)	0.952 (0.060)	0.960 (0.174)	1.309** (0.122)	0.992 (0.065)	1.113 (0.212)	1.370** (0.142)	1.028 (0.073)	1.355 (0.279)
Reward dependence	0.748*** (0.064)	0.909 (0.054)	0.805 (0.140)	0.861 (0.082)	0.961 (0.062)	0.879 (0.160)	0.873 (0.092)	0.931 (0.066)	0.851 (0.174)
Persistence	1.228* (0.103)	1.145* (0.067)	1.187 (0.211)	1.129 (0.100)	1.177** (0.072)	1.267 (0.232)	0.999 (0.098)	1.092 (0.073)	1.169 (0.240)
Active coping strategy							1.237* (0.127)	0.912 (0.062)	0.834 (0.169)
Personal meaning of work							1.209 (0.125)	1.510*** (0.108)	2.062*** (0.441)
Optimism							1.039 (0.130)	0.955 (0.079)	0.953 (0.231)
Overconfidence							1.762*** (0.192)	1.141 (0.084)	1.804** (0.395)
Female				0.701 (0.181)	0.785 (0.144)	0.396 (0.218)		0.647* (0.128)	0.336 (0.199)
Height				1.041** (0.014)	1.004 (0.010)	0.994 (0.028)	1.045** (0.015)	0.993 (0.010)	0.994 (0.030)
Education level				2.223*** (0.178)	0.798*** (0.045)	0.832 (0.139)	2.015*** (0.172)	0.783*** (0.047)	0.735 (0.133)
Urban origin				1.102 (0.196)	1.086 (0.143)	1.201 (0.487)	1.147 (0.218)	1.133 (0.160)	1.106 (0.492)

Table 4 (continued)

Variables	(1)			(2)			(3)		
	Managers	Self-employed without employees	Self-employed with employees	Managers	Self-employed without employees	Self-employed with employees	Managers	Self-employed without employees	Self-employed with employees
Lost parent by 14 years of age				1.002 (0.375)	0.863 (0.204)	0.983 (0.609)	0.974 (0.373)	0.851 (0.214)	1.086 (0.679)
Parent self-employed				1.080 (0.223)	1.091 (0.149)	2.444* (0.906)	1.075 (0.236)	1.118 (0.163)	2.252* (0.903)
Married				1.669* (0.334)	1.168 (0.142)	1.132 (0.400)	1.526* (0.325)	1.185 (0.157)	0.909 (0.339)
Work experience				1.038 (0.020)	1.037** (0.014)	1.040 (0.045)	1.025 (0.022)	1.035* (0.016)	1.024 (0.049)
Employment tenure				0.906*** (0.024)	0.976 (0.018)	0.881* (0.048)	0.902*** (0.025)	0.990 (0.019)	0.918 (0.053)
Constant	0.032*** (0.003)	0.088*** (0.005)	0.006*** (0.001)	2.61e-06*** (6.42e-06)	0.032 (0.057)	0.020 (0.100)	1.95e-06*** (5.17e-06)	0.233 (0.443)	0.025 (0.138)
Observations	4319	4319	4319	4219	4219	4,219	3699	3699	3699
Log likelihood	-2064	-2064	-2064	-1883	-1883	-1883	-1623	-1623	-1623
chi <sup>2</sup>	265.2	265.2	265.2	521.0	521.0	521.0	555.5	555.5	555.5
p	0	0	0	0	0	0	0	0	0
Pseudo R <sup>2</sup>	0.060	0.060	0.060	0.122	0.122	0.122	0.146	0.146	0.146

Standard errors in parentheses.

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ .



The results can be found from the supplementary information. We find that individuals in leadership positions present with a more balanced set of temperament traits than do the self-employed or paid employees. Our evidence suggests that to become a manager an individual needs relatively favorable scores in all temperament traits (low harm avoidance, but high novelty-seeking, reward dependence and persistence). In contrast, regarding economic preferences, self-employed individuals without employees come with relatively high levels of all economic preferences (risk-taking, time and social). These findings show that while economic preferences and temperament traits are distinct features among people in different types of leadership roles, no single temperament trait or economic preference determines the choices towards leadership positions.

## 5 Discussion

This paper explores the roles of economic preferences and temperament traits that distinguish different types of leaders in managerial and self-employment positions and paid employees in mid-life. A better knowledge of the individual determinants, at the population level, of occupational choices toward leadership could provide a wider understanding of what different types and combinations of individual traits are required in leadership roles. To the best of our knowledge, this is the first study to address this topic at the population level in terms of both temperament traits and economic preferences and how these may have determined individuals' occupational decisions towards leadership positions.

Our study reveals several important findings. First, regarding economic preferences, we show that leaders are more risk prone than paid employees are. This result is not new, but we do show that it is very robust, since using different types of survey instruments, such as a hypothetical experiment, self-rating and temperament-trait (harm avoidance) measures all give the same evidence that points to more risk-tolerant people as being more likely to be found in leadership positions. Previously, Castillo et al. (2010) have documented that managers who own the firm where they work are less risk averse than managers who do not own the firm. In this study, we find that self-employed and managers score rather similarly with respect to risk preference.

For individuals' time and social preferences, the evidence is mixed. We find that the self-employed without employees are more patient than paid employees but that there are no statistically significant differences across managers and the self-employed in regard to the time preference. Social preference of trust is significantly higher for managers than for employees. This is in line with the findings of Fehr and List (2004) and Holm et al. (2020). There is no statistically significant difference for trust between self-employed and employees.

Second, we find that Cloninger's temperament traits appear important determinants for leadership positions by midlife. We show that the relatively low level of harm avoidance and the relatively high levels of novelty-seeking and persistence distinguish leaders from paid employees. Our findings are novel and important since there is no previous evidence on how Cloninger's temperament traits are associated with individuals in leadership positions. We find that the temperament trait of harm avoidance is lower for managers and the self-employed than for paid employees and that it also differs among managers and the self-employed without employees. Novelty-seeking and persistence are higher for managers and the self-employed than for paid employees. We find no differences for reward dependence across these categories.

Third, our findings provide evidence that the occupational choices of self-employment and having a managerial position are not solely related to well-recognized human capital variables, such as education level and work experience. Importantly, differences in economic preferences and temperament traits lead apparently similar people to choose different career paths. We show that high novelty-seeking is an especially important feature for managers and that the other temperament traits cannot compensate for the lack of this one. In the same way, risk preference is an economic preference for the self-employed that other economic preferences cannot compensate for. While the notion that individual traits are associated with specific occupations dates back to the works of Schumpeter (1934), Roy (1951), Super (1953) and Holland (1997), this is the first study, to our knowledge, that shows that distinct features of economic preferences and temperament traits markedly affect individuals' leadership positions.

Fourth, in our analysis, we are also able to include the other well-established personal attitudes among covariates. Our results show that the high personal meaning placed on work relates with the higher probability of choosing self-employment instead of paid employment. In contrast, a higher propensity for using active coping strategies predicts a higher probability of an individual becoming a manager. We also find that overconfidence is higher among managers and the self-employed with employees than among the self-employed without employees and paid employees. We cannot, however, find any significant differences for optimism among the various leadership categories. This latter finding is somewhat surprising, since the conventional finding is that leaders, especially the self-employed, are more optimistic and self-confident than other individuals in the workforce (Koudstaal et al., 2016).

Fifth, we further contribute to the literature by showing that a balanced combination of all four temperament traits (sufficient levels in accordance to the leaders' typical patterning) seems to be present and needed for individuals in managerial positions. Similarly, sufficient amounts of all three types of economic preferences characterize individuals that have moved into self-employment without employees. However, our evidence is mixed for the self-employed with employees.

The strength of this study is that it is based on a large, unselected general population-level sample covering all sectors of Finland's national economy and occupations (a participation rate of almost 70%) and linked with highly accurate and reliable national register data that is free from any recall bias. Since the participants are of same, further biases arising from the results stemming from different macroeconomic cycles with different business and employment opportunities are avoided. In addition, as survey measures, we are able to use hypothetical experiments, self-reports and psychometrical measures for economic preferences, and temperament and other psychological traits. The advantage of using several measures makes our survey-based results more predictable. This approach is especially well-suited for identifying differences among occupational groups (Slovic et al., 1982).

Our study comes with some limitations. First, although we have a relatively large sample, the

response rates for managers and the self-employed are potentially troublesome. Using a questionnaire to collect data on preferences and traits may lead to cognitive bias. The use of self-reported information may lead individuals to overstate their true preferences and traits. To alleviate this bias, we used alternative measures when possible. Second, our results rely on within-country data for Finland, making the study's external validity somewhat limited. More work is needed to consider whether our findings apply in the contexts of different environments and leadership cultures. Third, due to the nature of the data, we are unable to provide evidence on how these economic preferences and temperament traits, in practice, affect entry and exit decisions regarding these types of leadership positions as measured in middle age. Fourth, there can be endogenous adaptation in economic preferences and beliefs. For example, Caliendo et al. (2009) and Brachert et al. (2017) show that entrepreneurs' risk attitudes may change considerably during their entrepreneurial career. Occupations might also affect how people want to perceive themselves in self-reported surveys. Many authors have noted that people have difficulties accurately predicting their preferences in survey questions (e.g., Dohmen et al., 2011). For example, self-employed people may want to portray themselves as more risk-taking than individuals who are paid employees. Similarly, business leaders may not want to portray themselves as resisting novelties. In addition, our preferences and traits are based on one survey which may cause some common method bias (Podsakoff et al., 2003 and Podsakoff et al., 2012). Fifth, since our main results concern three economic preferences and four temperament traits and their association for four occupational groups, there is always possibility of multiple testing problems and finding some significant results by chance.

For future studies, it would be interesting to explore how these preferences and traits predict later individual performance and success in business ventures. More research is also needed in the field of person-job matching for self-employment and managerial positions in terms of well-being. It would be especially interesting to investigate whether economic preferences and temperament traits help us understand why individuals exit or switch from leadership positions.

## 6 Conclusions

We expand the occupational choice literature by showing the importance of individual-level economic preferences and temperament traits to leadership roles among the middle-aged general population. We show that managers and the self-employed markedly differ from paid employees in their temperament traits and economic preferences. The temperament trait of novelty-seeking seems to be the single most important factor for an individual ending up in a managerial position. For self-employed people, the single most important determinant is the economic preference of risk tolerance.

We additionally show that in leadership positions, one probably needs a reasonable combination of each single economic preference for self-employment without employees and each single temperament trait for moving into a managerial position.

Our results have implications for ongoing research and theoretical development exploring the role of economic preferences and personality traits in the economics literature of entrepreneurship. By adding evidence about other personality traits than the widely used Big 5 traits, we can increase predictable power of the future models to predict occupational choice. For policy developers, educators, the consulting practitioners in the field, and for the leaders themselves, our findings prove useful information about traits and preferences in achieving best matches between individuals and business leaders' positions.

**Acknowledgements** Mikko Vaaramo thanks the Yrjö Jahnsson Foundation, the Alfred Kordelin Foundation, Liikesivistysrahasto and Oulu University Graduate School (UniOGS) for their generous support. We thank the participants in the 46-year study and the NFBC project center. NFBC data is available from the University of Oulu, Infrastructure for Population Studies. Permission to use the data can be applied for research purposes via electronic material request portal. In the use of data, we follow the EU general data protection regulation (679/2016) and Finnish Data Protection Act. The use of personal data is based on cohort participant's written informed consent at his/her latest follow-up study, which may cause limitations to its use. Please, contact NFBC project center (NFBCprojectcenter@oulu.fi) and visit the cohort website ([www.oulu.fi/nfbc](http://www.oulu.fi/nfbc)) for more information.

**Funding** Open Access funding provided by University of Oulu including Oulu University Hospital. NFBC 1966 received financial support from University of Oulu Grant no. 24000692 and Oulu University Hospital Grant no. 24301140.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

## References

- Almlund, M., Heckman, J., Duckworth, A. L., & Kautz, T. (2011). Personal psychology and economics. In E. Hanushek, S. S. Machin, & L. Wössman (Eds.), *Handbook of the Economics of Education* (pp. 1–181). Elsevier.
- Åstebro, T., Herz, H., Nanda, R., & Weber, R. A. (2014). Seeking the roots of entrepreneurship: Insights from behavioral economics. *Journal of Economic Perspectives*, 28(3), 49–70. <https://doi.org/10.1257/jep.28.3.49>
- Barsky, R. B., Juster, F. T., Kimball, M. S., & Shapiro, M. D. (1997). Preference parameters and behavioral heterogeneity: An experimental approach in the health and retirement study. *The Quarterly Journal of Economics*, 112(2), 537–579. <https://doi.org/10.1162/003355397555280>
- Becker, A., Deckers, T., Dohmen, T., Falk, A., & Kosse, F. (2012). The relationship between economic preferences and psychological personality measures. *Annual Review of Economics*, 4(1), 453–478. <https://doi.org/10.1146/annurev-economics-080511-110922>
- Becker, A., Enke, B., & Falk, A. (2020). Ancient origins of the global variation in economic preferences. *AEA Papers and Proceedings*, 110, 319–323. <https://doi.org/10.1257/pandp.20201071>
- Black, S. E., Devereux, P. J., Lundborg, P., & Majlesi, K. (2017). On the origins of risk-taking in financial markets. *The Journal of Finance*, 72(5), 2229–2278. <https://doi.org/10.1111/jofi.12521>
- Bönte, W., & Piegeler, M. (2013). Gender gap in latent and nascent entrepreneurship: Driven by competitiveness. *Small Business Economics*, 41(4), 961–987. <https://doi.org/10.1007/s11187-012-9459-3>
- Borghans, L., Duckworth, A. L., Heckman, J. J., & ter Weel, B. (2008). The economics and psychology of personality traits. *Journal of Human Resources*, 43(4), 972–1059. <https://doi.org/10.3368/jhr.43.4.972>
- Brachert, M., Hyll, W., & Titze, M. (2017). On the simultaneity bias in the relationship between risk attitudes, entry into entrepreneurship and entrepreneurial survival. *Applied Economics Letters*, 24(7), 477–480. <https://doi.org/10.1080/13504851.2016.1203056>
- Caliendo, M., Fossen, F. M., & Kritikos, A. S. (2009). Risk attitudes of nascent entrepreneurs—New evidence from an experimentally validated survey. *Small Business*

- Economics*, 32(2), 153–167. <https://doi.org/10.1007/s11187-007-9078-6>
- Caliendo, M., Fossen, F., & Kritikos, A. S. (2014). Personality characteristics and the decisions to become and stay self-employed. *Small Business Economics*, 42(4), 787–814. <https://doi.org/10.1007/s11187-013-9514-8>
- Caliendo, M., Fossen, F. M., & Kritikos, A. S. (2019). What makes an employer? *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3488169>
- Camerer, C., & Lovallo, D. (1999). Overconfidence and excess entry: An experimental approach. *American Economic Review*, 89(1), 306–318. <https://doi.org/10.1257/aer.89.1.306>
- Capanna, C., Struglia, F., Riccardi, I., Daneluzzo, E., Stratta, P., & Rossi, A. (2012). Temperament and character inventory—R (TCI—R) and Big Five Questionnaire (BFQ): Convergence and divergence. *Psychological Reports*, 110(3), 1002–1006. <https://doi.org/10.2466/02.03.09.PR0.110.3.1002-1006>
- Castillo, M., Petrie, R., & Torero, M. (2010). On the preferences of principals and agents. *Economic Inquiry*, 48(2), 266–273. <https://doi.org/10.1111/j.1465-7295.2009.00189.x>
- Cloninger, C. R. (1986). A unified biosocial theory of personality and its role in the development of anxiety states. *Psychiatric Developments*, 4(3), 167–226.
- Cloninger, C. R. (1987). A systematic method for clinical description and classification of personality variants. *Archives of General Psychiatry*, 44(6), 573. <https://doi.org/10.1001/archpsyc.1987.01800180093014>
- Cloninger, C. R., Svrakic, D. M., & Przybeck, T. R. (1993). A psychobiological model of temperament and character. *Archives of General Psychiatry*, 50(12), 975. <https://doi.org/10.1001/archpsyc.1993.01820240059008>
- Costa, P. T. & McCrae, R. R. (1992) Revised NEO Personality Inventory (NEO-PI-R) and NEO Five Factor Model (NEO-FFI) Professional manual. Odesa, FL; Psychological Assessment Center
- de Fruyt, F., van de Wiele, L., & van Heeringen, C. (2000). Cloninger's psychobiological model of temperament and character and the five-factor model of personality. *Personality and Individual Differences*, 29(3), 441–452. [https://doi.org/10.1016/S0191-8869\(99\)00204-4](https://doi.org/10.1016/S0191-8869(99)00204-4)
- Devonport, T. J., & Lane, A. M. (2006). Relationships between self-efficacy, coping and student retention. *Social Behavior and Personality: An International Journal*, 34(2), 127–138. <https://doi.org/10.2224/sbp.2006.34.2.127>
- Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association*, 9(3), 522–550. <https://doi.org/10.1111/j.1542-4774.2011.01015.x>
- Ekelund, J., Johansson, E., Järvelin, M.-R., & Lichtermann, D. (2005). Self-employment and risk aversion—Evidence from psychological test data. *Labour Economics*, 12(5), 649–659. <https://doi.org/10.1016/j.labeco.2004.02.009>
- Evans, D. S., & Leighton, L. S. (1989). Some empirical aspects of entrepreneurship. *The American Economic Review*, 79(3), 519–535.
- Falk, A., Becker, A., Dohmen, T., Enke, B., Huffman, D., & Sunde, U. (2018). Global evidence on economic preferences\*. *The Quarterly Journal of Economics*, 133(4), 1645–1692. <https://doi.org/10.1093/qje/qjy013>
- Feher, A., & Vernon, P. A. (2021). Looking beyond the Big Five: A selective review of alternatives to the Big Five model of personality. *Personality and Individual Differences*, 169, 110002. <https://doi.org/10.1016/j.paid.2020.110002>
- Fehr, E., & List, J. A. (2004). The hidden costs and returns of incentives—Trust and trustworthiness among CEOs. *Journal of the European Economic Association*, 2(5), 743–771. <https://doi.org/10.1162/1542476042782297>
- Frey, R., Pedroni, A., Mata, R., Rieskamp, J., & Hertwig, R. (2017). Risk preference shares the psychometric structure of major psychological traits. *Science Advances*, 3, 10. <https://doi.org/10.1126/sciadv.1701381>
- Golsteyn, B., & Schildberg-Hörisch, H. (2017). Challenges in research on preferences and personality traits: Measurement, stability, and inference. *Journal of Economic Psychology*, 60, 1–6. <https://doi.org/10.1016/j.joep.2017.03.001>
- Gorgievski, M. J., & Stephan, U. (2016). Advancing the psychology of entrepreneurship: A review of the psychological literature and an introduction. *Applied Psychology*, 65(3), 437–468. <https://doi.org/10.1111/apps.12073>
- Hamilton, B. H., Papageorge, N. W., & Pande, N. (2019). The right stuff? *Personality and Entrepreneurship. Quantitative Economics*, 10(2), 643–691. <https://doi.org/10.3982/QE748>
- Hébert, R. F., & Link, A. N. (1988). *The entrepreneur: Mainstream views and radical critiques* (2nd ed.). Praeger.
- Heckman, J., Jagelka, T., & Kautz, T. (2021). Some contributions of economics to the study of personality. In O. P. John & R. W. Robins (Eds.), *Handbook of personality: Theory and research* (pp. 853–892). The Guilford Press. <https://doi.org/10.3386/w26459>
- Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments* (3rd ed.). Psychological Assessment Resources.
- Holm, H. J., Opper, S., & Nee, V. (2013). Entrepreneurs under uncertainty: An economic experiment in China. *Management Science*, 59(7), 1671–1687. <https://doi.org/10.1287/mnsc.1120.1670>
- Holm, H. J., Nee, V., & Opper, S. (2020). Strategic decisions: Behavioral differences between CEOs and others. *Experimental Economics*, 23(1), 154–180. <https://doi.org/10.1007/s10683-019-09604-3>
- Hsieh, C., Parker, S. C., & van Praag, C. M. (2017). Risk, balanced skills and entrepreneurship. *Small Business Economics*, 48(2), 287–302. <https://doi.org/10.1007/s11187-016-9785-y>
- Ikedo, S., Kang, M.-I., & Ohtake, F. (2016). Hyperbolic discounting, the sign effect, and the body mass index. In *Behavioral Economics of Preferences, Choices, and Happiness* (pp. 277–313). Springer Japan. [https://doi.org/10.1007/978-4-431-55402-8\\_12](https://doi.org/10.1007/978-4-431-55402-8_12)
- Kaptein, A., & Teppa, F. (2011). Subjective measures of risk aversion, fixed costs, and portfolio choice. *Journal of Economic Psychology*, 32(4), 564–580. <https://doi.org/10.1016/j.joep.2011.04.002>
- Kihlstrom, R. E., & Laffont, J.-J. (1979). A general equilibrium entrepreneurial theory of firm formation based on risk aversion. *Journal of Political Economy*, 87(4), 719–748. <https://doi.org/10.1086/260790>

- Kimball, M. S., Sahn, C. R., & Shapiro, M. D. (2008). Imputing risk tolerance from survey responses. *Journal of the American Statistical Association*, 103(483), 1028–1038. <https://doi.org/10.1198/01621450800000139>
- Korhonen, M., Svento, R., & Vaaramo, M. (2020). Self-employment and psychometric measure of risk aversion: A replication and extension. *Applied Economics Letters*, 27(9), 697–702. <https://doi.org/10.1080/13504851.2019.1644429>
- Koudstaal, M., Sloof, R., & van Praag, M. (2016). Risk, uncertainty, and entrepreneurship: Evidence from a lab-in-the-field experiment. *Management Science*, 62(10), 2897–2915. <https://doi.org/10.1287/mnsc.2015.2249>
- Lazear, E. P. (2005). Entrepreneurship. *Journal of Labor Economics*, 23(4), 649–680. <https://doi.org/10.1086/491605>
- Moore, D. A., & Kim, T. G. (2003). Myopic social prediction and the solo comparison effect. *Journal of Personality and Social Psychology*, 85(6), 1121–1135. <https://doi.org/10.1037/0022-3514.85.6.1121>
- Moskowitz, T. J., & Vissing-Jørgensen, A. (2002). The returns to entrepreneurial investment: A private equity premium puzzle? *American Economic Review*, 92(4), 745–778. <https://doi.org/10.1257/00028280260344452>
- Nordström, T., Miettunen, J., Auvinen, J., Ala-Mursula, L., Keinänen-Kiukaanniemi, S., Vejjola, J., Järvelin, M.-R., Sebert, S., & Männikkö, M. (2021). Cohort Profile: 46 years of follow-up of the Northern Finland Birth Cohort 1966 (NFBC1966). *International Journal of Epidemiology*, 50(6), 1786–1787j. <https://doi.org/10.1093/ije/dyab109>
- OECD Regions and cities at a glance (2020) OECD Publishing. <https://doi.org/10.1787/959d5ba0-en>
- Parker, S. C. (2018). *The economics of entrepreneurship*. Cambridge University Press. <https://doi.org/10.1017/9781316756706>
- Paunonen, Sv., & Ashton, M. C. (2001). Big Five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology*, 81(3), 524–539. <https://doi.org/10.1037/0022-3514.81.3.524>
- Pekkala-Kerr, S., Kerr, W. R., & Xu, T. (2018). Personality traits of entrepreneurs: A review of recent literature. *Foundations and Trends® in Entrepreneurship*, 14(3), 279–356.
- Pekkala-Kerr, S., Kerr, W. R., & Dalton, M. (2019). Risk attitudes and personality traits of entrepreneurs and venture team members. *Proceedings of the National Academy of Sciences*, 116(36), 17712–17716. <https://doi.org/10.1073/pnas.190837511610.1561/0300000080>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63(1), 539–569. <https://doi.org/10.1146/annurev-psych-120710-100452>
- Puri, M., & Robinson, D. T. (2005). *Optimism, entrepreneurship and economic choice* (NBER Working Paper).
- Rauch, A., & Frese, M. (2007). Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of Work and Organizational Psychology*, 16(4), 353–385. <https://doi.org/10.1080/13594320701595438>
- Roy, A. D. (1951). Some thoughts on the distribution of earnings. *Oxford Economic Papers*, 3(2), 135–146. <https://doi.org/10.1093/oxfordjournals.oep.a041827>
- Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, 67(6), 1063–1078. <https://doi.org/10.1037/0022-3514.67.6.1063>
- Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle* (Harvard Economic Studies, Ed.; Vol. 46). Harvard College.
- Shen, Y. E. (2009). Relationships between self-efficacy, social support and stress coping strategies in Chinese primary and secondary school teachers. *Stress and Health*, 25(2), 129–138. <https://doi.org/10.1002/smi.1229>
- Shir, N., Nikolaev, B. N., & Wincent, J. (2019). Entrepreneurship and well-being: The role of psychological autonomy, competence, and relatedness. *Journal of Business Venturing*, 34(5), 105875. <https://doi.org/10.1016/j.jbusvent.2018.05.002>
- Slovic, P., Fischhoff, B., & Lichtenstein, S. (1982). Why study risk perception? *Risk Analysis*, 2(2), 83–93. <https://doi.org/10.1111/j.1539-6924.1982.tb01369.x>
- Stewart, W. H., & Roth, P. L. (2001). Risk propensity differences between entrepreneurs and managers: A meta-analytic review. *Journal of Applied Psychology*, 86(1), 145–153. <https://doi.org/10.1037/0021-9010.86.1.145>
- Super, D. E. (1953). A theory of vocational development. *American Psychologist*, 8(5), 185–190. <https://doi.org/10.1037/h0056046>
- Thaler, R. H. (2000). From homo economicus to homo sapiens. *Journal of Economic Perspectives*, 14(1), 133–141. <https://doi.org/10.1257/jep.14.1.133>
- University of Oulu: Northern Finland Birth Cohort 1966. University of Oulu. <http://urn.fi/urn:nbn:fi:att:bc1e5408-980e-4a62-b899-43bec3755243>. Accessed date: February 3 2022
- van Praag, C. M., & Cramer, J. S. (2001). The roots of entrepreneurship and labour demand: Individual ability and low risk aversion. *Economica*, 68(269), 45–62. <https://doi.org/10.1111/1468-0335.00232>
- Zhao, H., & Seibert, S. E. (2006). The Big Five personality dimensions and entrepreneurial status: A meta-analytic review. *Journal of Applied Psychology*, 91(2), 259–271. <https://doi.org/10.1037/0021-9010.91.2.259>
- Zhao, H., Seibert, S. E., & Lumpkin, G. T. (2010). The relationship of personality to entrepreneurial intentions and performance: A meta-analytic review. *Journal of Management*, 36(2), 381–404. <https://doi.org/10.1177/0149206309335187>

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.