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Life Span Cognitive Development of Age Groups and Its Influence on the Determinants of Early Stage and Serial Entrepreneurship

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Abstract

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ABSTRACT:

Earlier studies in entrepreneurship identified an inverse U shape relationship between age and entrepreneurship (Parkar, 2004; Hart et al., 2004). But to date it is not certain why such kinds of relationship exist. One of the reasons may be the cognitive development of age groups which influence the determinants of entrepreneurship. This study has been initiated to investigate how cognitive characteristics of age groups modify the influence of opportunity identification and start-up skills in early stage entrepreneurial activity and in serial entrepreneurship. To answer these two questions we developed two series of logit models for interaction terms to test our hypotheses. We used margin analysis and double difference technique to identify interaction effects in our analysis. The study identified that opportunity identification has more positive influence on early stage entrepreneurial activity when the opportunity is identified by young adults rather than the other two age groups. On the other hand, opportunity identification has more influence on serial entrepreneurship when the opportunity is identified by older people rather than the two other age groups. There is no significant difference between young adult and middle age people in the influence of opportunity identification in early stage entrepreneurship when we compare only these two age groups. However, this difference is significant in serial entrepreneurship. The result is almost similar in case of age effects on skills in both early stage and serial entrepreneurship. The sensitivity analysis showed that the definition of young adult is significantly sensitive in the interactions with opportunity identification.

Key Words: Entrepreneurship Behaviour, Cognitive Age, Serial Entrepreneurship, Opportunity, Skill.

INTRODUCTION:

After the limited success of the ‘personality trait’ theory of entrepreneurship in 1980s, ‘cognitive’ and ‘planned behaviour’ theories (Ajzen, 1991; Kruger et al, 2000) were widely used in the last decade. But these theories assumed that factors influencing entrepreneurship had similar effects on cognitive conditions as well as on behaviour irrespective of the psychological development of different age groups. As the psychological development of an individual is a contextual and life long process (Bandura, 2001, 2002); individual perception, intention, self-efficacy, and cognition will be different at different stages of the human life cycle. The level of cognitive development of young adults and other age groups will not be the same because of different levels of interaction with real world situations and cognitive development stages. Hence the responses of different age groups to stimulus will not be identical within the same entrepreneurial environment. To explain this relationship, Levesque & Minniti (2006) argued that a negative relationship exists between age and entrepreneurial attitude. These indicate different cognitive stages of the cognitive determinants of entrepreneurship among the age cohorts.

In entrepreneurship, opportunity identification competency and the start-up skills are the two key determinants of entrepreneurial activity. Opportunity identification is a stimulus to start a business and starting a business requires necessary skills. Opportunity identification competency (Gaglio & Katz, 2001) and uses of skills (Bjork & Bjork, 1992) of an individual depend on his cognitive development. Individuals differ in their cognitive development. Age is a rough index of a person’s psychological or cognitive development (Hoyer & Roodin, 2009). Since opportunity identification and skill depend on cognitive development, the age of an individual may modify the influence of

opportunity identification and skill in the start-up process. Previous studies in entrepreneurship (Parker, 2004; Hart et. al, 2004) found that there is an inverse U shape relationship between age and entrepreneurial activity. But existing entrepreneurship literature is insufficient to explain why individuals differ in entrepreneurial activity by age. One of the probable answers is that age is modifying the influence of opportunity identification and skill in the start-up process, which results in a variation in the entrepreneurial activity by age.

In addition, numerous previous studies (Parkar, 2012; Ucbasaran et al., 2009; Shepherd & DeTienne, 2005) identified that habitual or serial entrepreneurs can identify better opportunities than others. Gaglio & Katz (2001) argued that those with earlier start-up experience developed a complex mental framework to identify opportunities before others. When entrepreneurs repeat their start-up activity as a habitual or serial entrepreneur, it is important to know how age related cognitive development modifies the influence of opportunity identification and skills in serial entrepreneurship. Theories in psychology have argued that age related cognitive decline becomes insignificant in the cases of repeated works (Bjork & Bjork, 1992). Considering the above, this study would like to address the question of how age modifies opportunity identification and skills in the start up process. We are also interested to know how this modification changes in serial entrepreneurship. To answer these questions, we would like to use theories of cognitive psychology including life span cognitive development theory.

THEORETICAL BACKGROUND:

Age is a multidimensional concept. Age can be chronological, biological, or psychological. Chronological age refers to the number of years elapsed from the date of birth of an individual. Biological age is the estimation with respect to the potential life span of an individual. It involves measuring the vitality or neurobiological health of an individual. Psychological age refers to the ability of an individual to adapt to changing environmental demands. This is also called cognitive age (Stuart-Hamilton, 2012). Individuals respond to their environment based on their learning, memory, intelligence, emotional control, motivational strengths and so on. Though there are three concepts of age, chronological age per se is only a rough index of psychological (cognitive) or biological development (Hoyer & Roodin, 2009). Cognitive psychology deals with mental processes like: memory, language, processing speed, reasoning, and decision making etc. Scientific evidence indicates that mental processes do become less efficient when people become older on the one hand, but growth and experience with growing age can solve complex moral and social problems on the other (Baltes & Staudinger, 1993). These differences in cognitive conditions of age are discussed in lifespan cognitive psychology.

There are three orientations of individuals in their life cycle according to life span psychology. These are - growth orientation at a young age, maintenance orientation in middle age, and prevention orientation in old age (Craik & Bialystok, 2006). The young age is characterised by biological agility of acquisition and development for future growth. It means, at this stage, young people like to acquire knowledge, skills and opportunities with agility. Adoption of changes is another characteristic of this stage. So, response to environmental stimulus (e.g. business

opportunity) will be the quickest at a young age. Middle age refers to the process that ensures stability of functional levels. This characteristic reveals that people will be less responsive to environmental or professional drivers in middle age in comparison to the young age. In old age phase, people remain 'loss prevention oriented', which refers to avoiding negative and undesired changes in life (Baltes, 1987; Heckhausen et. el. 1989; Freund & Baltes, 2000, Ebner et al., 2006). Because of the differences in cognitive goal orientation in the three lifespan cognition, individuals' decisions to be involved in entrepreneurial activity or entrepreneurial behaviour will be different within the same environmental context. In the remaining part of the theoretical development the influences of these three orientations of cognitive conditions are discussed to explain their influences on opportunity identification and skills to be engaged in entrepreneurial activity.

Information processing speed and Age

Human intelligence has been divided into two classifications. These are fluid intelligence, and crystallised intelligence. Fluid intelligence is the ability to solve novel problems while crystallised intelligence is the pre-existing knowledge of an individual. Fluid intelligence includes inductive reasoning, spatial reasoning, perceptual speed and numeric ability. On the other hand, crystallised intelligence includes verbal ability and verbal memory (Schaie, 2005). This includes different concepts, vocabularies, definitions, statements etc. It is widely accepted that fluid intelligence declines in later life and crystallised intelligence is either increases or remains stable throughout the life (Horn & Cattell, 1967; Rabbitt, 2004; Schaie, 2008; Salthouse, 2009; Verhaeghen, 2011). The changes in the fluid intelligence of an individual affect his reaction time. Reaction time is the time taken to respond to a stimulus. It is the time individual takes to respond to the stimulus after the stimulus first appears to him. It is well established that the reaction time gets slower as people get older

(Stuart-Hamilton, 2012). There are two reasons for this. Primarily, older people nervous systems are slower and less efficient at conducting signals. With growing age people store more information in their memory. This additional information needs extra time to be processed. Secondly, old people are in disadvantageous conditions in processing extra choices in life course. These extra choices made the response slower when people are aging. In a meta-analysis on 172 studies Sheppard & Vernon (2008) found that speed of processing and cognitive ability have a reliable and significant correlation. Since speed of processing declines with growing age, the cognitive ability of individuals declines with growing age. Opportunity identification requires processing information to understand the market anomalies. So, at the old age weaker information processing speed and declining cognitive ability will reduce the effectiveness of opportunity identification.

In a review of literature on venture creation process Baron (2007) identified that there are three key tasks in venture creation process. These are: 1) generating ideas for new venture creation, 2) recognising opportunities related to these ideas, and 3) obtaining the resources needed for developing these ideas through the launch of a new venture. In search of factors responsible to generate ideas and opportunities, Baron (2007) argued that concepts play the key role in generating ideas and pattern recognition plays the primary role in recognising opportunities. However, concepts and pattern recognitions are not sufficient to generate ideas and to recognise opportunities for several reasons (Bygrsbr & Zacharakis, 2008; Mariotti & Glackin, 2012; Stoke et al, 2010). Firstly, a business idea can be treated as opportunity if it meets some criteria. These are: i) business ideas need to be executable, ii) profitable, and iii) sustainable. If these criteria are met, we can consider a business idea as opportunity. Secondly, pattern recognition is the core of business idea, not the primary step of opportunity identification. For example: a demographic change in the population (a change in the birth rate) will provide some business ideas to the potential or existing entrepreneurs. A comparative analysis of the potential business ideas based on the above three criteria will help to recognise opportunities. Thirdly, concepts alone are not sufficient to generate business idea.

Concepts are the part of individual verbal ability and verbal memory (Hoyer & Roodin, 2009). These are part of crystallised intelligence. On the other hand, inductive reasoning, spatial reasoning, and perceptual speed are also required to generate ideas. These are part of fluid intelligence which declines by age. A potential entrepreneur needs both the intelligences to recognise an opportunity.

Entrepreneurs primarily evaluate and compare the ideas heuristically to identify potential business opportunities (Baron, 2004). To evaluate and compare ideas heuristically potential entrepreneurs need to depend on their cognitive ability and speed of information processing. As per the discussion above, age is a critical factor for intelligence and speed of information processing. Old people take longer time to process information and use simpler, less cognitively demanding strategy (Mata et al., 2007). Their age related cognitive decline (decline in fluid intelligence) leads them to choose simpler strategy. Since fluid intelligence declines and speed of information processing becomes slower in the old age, the impact of opportunity identification in early stage entrepreneurial activity will decline in the old age. Thus following hypothesis can be developed:

Hypothesis 1: The influence of opportunity identification on early stage entrepreneurial activity will be moderated by the age group an individual belong to, such that opportunity identification will have more positive influence on early stage entrepreneurial activity when the opportunity is identified by young adult rather than middle age or old age people.

Entrepreneurial Experience, opportunity Identification and Age:

Previous studies in entrepreneurship identified that the influence of entrepreneurial experience in opportunity identification is significant (Gruber et al., 2010; Ucbasaran et al, 2009; 2010; Dimov, 2007; Rerup, 2005; Shepherd & DeTienne, 2005). Ucbasaran et al. (2003) argued that prior business ownership experience impacts on habitual entrepreneur's mindset as well as his or her knowledge base to identify and explore business opportunity. They found that habitual or serial entrepreneurs can identify almost double opportunities than the early stage (novice) entrepreneurs in a period. Habitual entrepreneur is the entrepreneur who has the experience of more than one start-up as an entrepreneur. If the entrepreneur start businesses one after another is called serial entrepreneur. On the other hand, if he start/inherit/purchase and retain ownership of several business at a time is called portfolio entrepreneur (Parker, 2012; Plehn-Dujowich, 2010; Ucbasaran et al., 2008; Westhead et al., 2005; Westhead & Wright, 1998; MacMillan, 1986). To explain how experience influence opportunity identification Gaglio & Katz (2001) argued that a complex schema characterised by cross link of other schemata helps experienced entrepreneurs to see pattern development and to detect market anomalies before others. Schemata are dynamic, evolving mental models that guide individuals in their information processing and reasoning. Chronic complex schema habitually activated automatically to guide the individual in a particular situation (Fiske & Taylor, 1991). This automated activation helps to reduce their information processing time even in a complex situation. In entrepreneurship, prior continual start-up experience helps serial entrepreneurs to activate their opportunity searching schema to find market anomalies in ambiguous situation regardless of information load (Gaglio & Katz, 2001; Bargh, 1989). They can find a pattern in a seemingly unrelated area in a more meaningful way than inexperienced entrepreneurs (Baron & Ensley, 2006). This pattern recognition helps them to

identify opportunity before others. McGrath & MacMillan (2000) identified that habitual entrepreneurs have a unique entrepreneurial mindset that prompts them to search for opportunity, and only to pursue the best opportunity. So, entrepreneurial experiences with growing age for serial or portfolio entrepreneurs develop a mental framework (schema) to identify more executable opportunity.

In psychological analysis Salthouse (1985) found that there is no difference in typing speed between younger adult and older typist. Typing is a psychomotor performance of an individual. In the analysis it has been found that though younger typist had more agility but older typist planned longer sequences of finger movement than younger typist. In another study among novice or experienced typist Charness et al (2001) found that young adults learn and retain information faster than other age groups of novice typist. However, among the experienced participants older people learn faster than other age groups. Experience in the same field compensates physical declines. Experience and training in the later life can compensate age related cognitive decline (Linderberger et al., 2008). Serial start-up experience helps to accumulate domain specific knowledge in entrepreneurship. Accumulated domain-specific knowledge enhances performance and makes the performance less demanding on processing resources even when individuals are suffering from cognitive or other impairments (Hoyer & Roodin, 2009) because of age related declines. This habitual functioning in the old age helps to identify better opportunity and ensures more influence of opportunity in the old age over the other age groups in serial start-up. Thus, following hypothesis can be developed:

Hypothesis 2: The influence of opportunity identification on serial entrepreneurial activity will be moderated by the age group an individual belong to, such that opportunity identification will have more positive influence on serial entrepreneurial activity when the opportunity is identified by old age entrepreneur rather than young adult or middle age entrepreneur.

Use of Skills and Age

It is widely accepted that human capital or skill is an important construct in entrepreneurship. There are two kinds of skills in psychological analysis (Rogers, 1996): i) task specific skills, and ii) stimulus specific skills. Task specific skills are the general skills related to the procedure of a task. For example: general knowledge on starting and running a business is the task specific skills. On the other hand stimulus specific skills are the skills related to completing a particular piece of work or stimuli. In starting a business the stimulus specific skills are the skills related to starting a specific type of business. Here opportunity to starting a new business may be the stimulus. So, skill related to start a business to pursue a specific opportunity is the stimulus specific skill. Studies identified that there is no age related significant difference in task specific skills (Fisk et al., 1994; Fisk & Hodge, 1992). However, there is a significant difference between young adult and old people in stimuli specific skills. Young adults showed greater retention of stimulus-specific information (Rogers, 1996) in Rogers et al.). This depicts that young adults may have higher level of skills necessary to start a business. After recognising an opportunity a potential entrepreneur needs to manage resources and completing the legal procedure to start a business. So, it is expected that business start-up skills of young adults will be modified by their age character to start a business. This situation can be better explained by disuse theory.

In psychology, disuse theory argued that if individual skills remain unused it will decline. This theory explains that if individual fails to use his skills, the skills eventually fall into a decline. The decline is related with age (Stuart-Hamilton, 2012). Disuse theory emerged from the law of disuse given by Thorndike (1914). In the law Thorndike stated “When a modifiable connection is not made between a situation and a response during a length of time that connection’s strength is decreased.” The implication of the law is that disuse produces forgetting over time. In the explanation of the theory Thorndike (1913) stated “To the situation, ‘a modifiable connection not being made by him between a situation S and a response R, during a length of time T,’ man responds originally, other things being equal, by a decrease in the strength of that connection.” Based on this explanation the theory is considered as a major explanatory condition of forgetting. However, McGeoch (1932) argued that disuse is one of the contributing factors of forgetting rather than the function of time alone. He also mentioned that though disuse and forgetting are correlated, there is no evidence that disuse causes forgetting. Subsequent studies discredited the disuse theory for the failure not to accommodate intervening factors of forgetting.

Considering the above and subsequent studies, Bjork & Bjork (1992) has given the ‘new theory of disuse’ by accommodating intervening factors. With the original theory of disuse the new theory stand on the foundation that the information (here skills) in memory may be at some point in time eventually become nonrecallable with disuse no matter how accessible and overlearned they are. Unlike original theory they argued that human memory has unlimited storage capacity and information may remain in the memory for an indefinitely long-term period. However, the information retrieval system is highly erratic and cue dependent. In the human memory, information retrieved from the memory becomes more retrievable in the future and the other information become less retrievable. A huge body of empirical research (please see Bjork & Bjork, 1992 pp. 37 for detail list) suggest the above positive and negative assertion. This cue dependent retrieval aspect of disuse explained that an item in the memory will be inaccessible if it is not retrieved periodically even if it is well learned. The gradual loss of retrieval access is not a consequence of

the mere passage of time, but rather, is a consequence of the learning and practice of the other items. When we update our memory representation by learning a new skill the new representation will be the most accessible at the end of the learning process. With disuse of the both representations there will have loss of access to the most recent representation and a recovery of access to earlier representation in human memory.

Human memory keeps skill information of individuals. Following the retrieval principle of disuse theory, we can discuss retrieval of skills from two perspectives. Firstly, if an entrepreneur is in the early start-up stage, and secondly, if the entrepreneur is a serial entrepreneur – one who are in the entrepreneurship career and initiated entrepreneurial venture one after another. The discussion on skill and serial entrepreneurship is given in the next section. As per disuse theory, the influence of skill for these two groups of people will not be the same. In the young age business start-up skills will be more retrievable than in the old age for the entrepreneur who is in the early start-up stage of a business. People in the old age will have more intervening skills other than the business start-up skills. Throughout their professional life people may gain different business and non business related skills by working in different business and non business organisations. These non-business start-up skills are the intervening skills to business start up skills. As a result, business start-up skills will be less retrievable than the other professional skills in the old age. There will have a gradual loss of retrieval access to business start-up skills with growing age for the non entrepreneurs who are trying to start a business. Thus, the following hypothesis can be developed:

Hypothesis 3: The influence of skill on early stage entrepreneurial activity will be moderated by the age group an individual belong to, such that skill will have more positive influence on early stage entrepreneurial activity when young adults have the skill rather than middle age or old age people.

Entrepreneurial Experience, Skill and Age:

Several work identified that serial entrepreneur signals high level of general and entrepreneurial-specific skills (Amaral et al., 2011; Ucbasaran, 2008; Westhead et al. 2005). In serial entrepreneurship, business start-up skills will be more retrievable in the old age than in the young adult or middle age because of periodic retrieval and immediate representation (Rabbitt, 1980). As a result skill will have more influence in old age than other two age groups in serial entrepreneurship. Young serial entrepreneurs have less repeated use of their skills than the older serial entrepreneurs. Consequently, given the inherently dynamic nature of serial entrepreneurship (Amaral et al., 2011), the influence of skills in old age for serial entrepreneurs will be comparatively higher than the influence of skills for serial entrepreneurs at young age. The principal assumption here is, as said earlier, old serial entrepreneurs have more habitual use of their entrepreneurial skills than the young serial entrepreneurs. Considering the above following hypotheses can be developed:

Hypothesis 4: The influence of skill on serial entrepreneurial activity will be moderated by the age group an individual belong to, such that skill will have more positive influence on serial entrepreneurial activity when skill possess by old age entrepreneur rather than young adult or middle age entrepreneur.

DATA AND METHODS

Method:

To test the hypotheses we primarily used logit regression analysis. We used two series of logit regression to analyse the interaction impact of age on opportunity and skill in the early stage entrepreneurial activity and in serial start-up activity. We considered total early stage entrepreneurial activity to analyse the entrepreneurial behaviour for two reasons: firstly, total early stage entrepreneurial activity includes both, as per global entrepreneurship monitor (GEM), nascent entrepreneurship and new business owners without double counting. The stage covers businesses from 3 to 42 months. This period is important for business sustainability. Secondly, nascent entrepreneurship rate in countries is very low which may generate biased significant result. Considering these we considered total early stage entrepreneurial activity instead of nascent entrepreneurship. We considered three age groups - 'young-adult' group aged from 18 to 35, and two older age groups: '36 to 55 aged & 56-70 aged. A detail discussion on age groups is given in the independent variable sections.

In each series of logit regression there are nine equations. In the first equation, we considered all control variables and independent variables. Here we consider age1870 which is a continuous variable. In the second equation, we test the interaction of age1870 with opportunity. This is an interaction between a continuous and a dichotomous variable. In the third, fourth and fifth equation we interact opportunity with age1835, age5670, and age1835a respectively. These interactions were between two dichotomous variables. To test the interaction between age and skill we repeat the equation two to five for the interactions between skill and age groups. So, equation six deals with interaction between age1870 and skill. The remaining three equations deal with

interaction between skill and 3 dummies of age groups. The strategy of interpreting the interaction effects discussed later part of this section.

Dependent Variables:

Our dependent variables are ‘Early-stage Entrepreneurial Activity’ and ‘Serial Start-up Entrepreneurial Activity’. Primarily, we are interested to test how ages modify the influences of opportunity recognition and skill in the early stage entrepreneurial activity. Secondly, we are interested to test how these influences are changing in serial entrepreneurial start-up. Serial entrepreneurs are the entrepreneurs who, alone or with others, start and manage business one after another. In our study both the variables are dichotomous.

Control Variables:

In the study, we control for demographic variables: male (gender), White (ethnicity), England (Region), Immigrant. Cognitive variable: Fear of failure; and other non-cognitive variables: Graduate (Education), Employment, Discontinue a business. The responses of all variables are dichotomous. Among the demographic variables, the response for male is one and for female is zero; white is for one and all non white is zero; if the respondent is living in England the response is one and if the respondent is living in any of the three remaining regions of UK the response is zero; the response for Immigrant is one and if the respondent is non immigrant the response is zero. The cognitive variable fear of failure is literally opposite to the self-efficacy (Bandura, 2002) or perceived behavioural control (Ajzen, 1991) variable. In self-efficacy or in perceived behavioural control we measure impact of perception of success in behaviour. On the other hand fear of failure measured the impact of perceived fear to prevent in start-up. Among the other non-cognitive variables, if the respondent completed graduate and above level of education the response is one otherwise the response is zero; If the respondent worked either fulltime or part-time the response of

employment is one and if not the response is zero; if the respondent discontinued or shutdown a business in the last twelve months the response is one, otherwise the response is zero.

Independent variable:

Our variables of interest are opportunity identification, skill and age1870. Opportunity identification and skill both are dichotomous variable. On the other had age1870 is a continuous variable. This is the exact age of the respondents at the time of survey. To analyse the pattern of influence of age on the dependent variables we have generated age1870 square variable which explains the quadratic relationship. To explain the specific effect of each age group we have generated three dummy variables for three age groups – young adult, middle age, and old age group. First variable age1835 represents young adults. We considered age1835=1 for age 18 to 35 and age1835=0 for the age 36 to 70. This variable explained the likelihood of young adult over two other age groups. Second variable age5670 compares old people over two other younger groups. age5670=1 if respondent age is from 56 to 70 and age5670=0 if respondent age is from 18 to 55. To test the influence of young adult over middle aged people we created dummy variable age1835a. We considered age1835a=1 if the age range is from 18 to 35 and age1835a=0 if the age range is from 36 to 55.

Interaction Effects:

Interaction effects evaluate the effect that a change in one independent variable has on the effect of a change in another independent variable on the dependent variable. In our study, the independent variables 'age1870' 'age1835', 'age5670' and 'age1835a' were interacted with skill and opportunity to determine if there is any age difference in the magnitude of the effects that opportunity and skill have on either early stage entrepreneurial activity or serial entrepreneurial activity. Ai & Norton (2003) found that most applied researchers in the top journals incorrectly interpret the coefficient on the interaction terms in nonlinear models though interaction terms are widely used in the social sciences. Researchers interpret wrongly the marginal effects of interaction terms instead of interaction affects of interaction terms. Ai & Norton (2003) argued 'Interaction effects cannot be evaluated simply by looking at the sign, magnitude, or statistical significance of the coefficient on the interaction term when the model is nonlinear. ... It can have different signs for different observation, making simple summary measures of the interaction effect difficult.'

Interaction terms require calculating the cross derivative or cross difference. Norton et al. (2004) explained the interaction effect of different combinations of continuous and discrete variables. When the interacted variables x_1 and x_2 in a nonlinear function (here in a logit model) are both continuous, the interaction effect is the cross derivative with respect to x_1 and x_2 . The interaction effects of two dummy variables are the discrete double difference. The interaction affect of one continuous variable and one dummy variable is the discrete difference (with respect to x_2) of the single derivative (with respect to x_1). Norton et al. (2004) developed three formulas for single interaction for same independent variable in their analysis.

Though Norton et al. (2004) identified the discrepancy in the interaction effects analysis, they did not accommodate the interaction effects direction of interaction affect based on the value label of the independent variable rather gives a mean interaction effect result. So, we only can get an average understanding using their formulas since it does not say anything about which values of independent variable cause the specific interaction result. Consequently, our understanding on interaction effects needs

more clear analysis. There are two other ways to analyse interaction effects. These are: 1) margin analysis, 2) Interaction effect analysis using cross derivatives (Buis, 2010). In our analysis, firstly, opportunity and skills were interacted with age1870. Secondly, opportunity and skills were interacted with dummy variables for age groups age1835, age5670, age1835a respectively.

Data:

We have used Global Entrepreneurship Monitor (GEM) UK adult population survey data. Among the existing data sets, GEM data covers the most variables for demographic and cognitive analysis of entrepreneurial activity. The available GEM UK survey data were collected every year from 2002. We have used GEM UK 2002-2010 pool data set (the latest available data set at the time of analysis). Since GEM survey is conducted through random telephone (Both Land and Mobile) interview it is out of selection bias. Existing GEM data set included six attitudinal variables with necessary demographic, biological and social data. We restrict our analysis to individuals of 18-70 years of age and the total number of useable observations in our samples is 86670. GEM UK identified serial entrepreneur in the year 2007, 2008 & 2010. The total number of useable observations for serial entrepreneurship for the age range 18-70 is 1373.

In life span cognitive analysis both cross-sectional and longitudinal data were used. The results showed that there are significant differences in the results using two types of data set. In a study Salthouse (2009) found that there is a discrepant age trend in cognitive performance from 18 to 60 years of age between cross sectional data and longitudinal data. The main point of argument among the studies based on the two types of dataset is when the age related cognitive declines start. Previous studies found cognitive declines start at the late in life. Ronnlund et al (2005) found

that cognitive decline begins at age 55. Albert & Heaton (1988) found that there is little cognitive decline until age 50. Schaie (1989) stated that “.....*most abilities tend to peak in early midlife, plateau until the late fifties or sixties, and then show decline, initially at a slow pace, but accelerating as the late seventies are reached.*” Contrary to these studies Salthouse (2009) argued that there are many abilities which begin to decline from the age 20. Salthouse used longitudinal data in his study. In response to this finding, Schaie (2009) argued that there is cohort effect of age which must be controlled when one is using longitudinal data. He stated that age changed within individuals over time can be inferred from cross-sectional age differences between groups of individuals and it has been done successfully in last 40 years. Based on the above assertion in psychology, we used GEM UK pool data set which is cross sectional.

The data allow us to analyse the cognitive response of different age groups in a point of time. It is not an analysis of the responses of an individual over the life span. Since we are interested for a general understanding about life span analysis of entrepreneurial behaviour of different age groups in a point of time we used GEM data. However, it will not allow us to analyse the cognitive changes and its impact on responses to entrepreneurial behaviour. Overall, this helps us to understand cognitive responses of age groups following the lifespan theory in a point of time.

Descriptive Statistics:

Correlation matrix for early stage entrepreneurial activity shows that there is no multi-collinearity problem among the variables. Though the magnitude of correlations between entrepreneurial activity and all other variables are poor, the level of significance of the correlations is highly

significant. Descriptive statistics show that 5.1% respondents are entrepreneurially active in the start-up process. The demographic characteristics of the respondents are: a) average age is 45 years with 13 years standard deviation, b) 42% respondents are male, c) 95% are white, d) 7% are immigrant, and e) 63% are living in England. Other cognitive and non-cognitive characteristics are:

Table-1: Descriptive Statistics for Early stage entrepreneurial Activity

| SL No | Variable | Mean | S.D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-------|--------------------------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|--------|-------|
| 1 | Entrepreneurial Activity | 0.051 | 0.220 | | | | | | | | | | | | |
| 2 | Age1870 | 45.25 | 13.39 | -0.06* | | | | | | | | | | | |
| 3 | Male | 0.423 | 0.494 | 0.08* | 0.02* | | | | | | | | | | |
| 4 | Opportunity | 0.308 | 0.462 | 0.15* | -0.09* | 0.09* | | | | | | | | | |
| 5 | Skill | 0.473 | 0.499 | 0.19* | -0.01 | 0.20* | 0.20* | | | | | | | | |
| 6 | White | 0.953 | 0.211 | -0.03* | 0.15* | -0.01* | -0.03* | -0.02* | | | | | | | |
| 7 | England | 0.629 | 0.483 | 0.01* | 0.03* | 0.01* | 0.02* | 0.02* | -0.10* | | | | | | |
| 8 | Immigrant | 0.067 | 0.249 | 0.02* | -0.09* | 0.01* | 0.04* | 0.03* | -0.46* | 0.07* | | | | | |
| 9 | Graduate | 0.281 | 0.450 | 0.06* | -0.11* | 0.04* | 0.13* | 0.14* | -0.08* | -0.002 | 0.12* | | | | |
| 10 | Employment | 0.699 | 0.459 | 0.12* | -0.30* | 0.08* | 0.11* | 0.17* | -0.01* | 0.001 | 0.02* | 0.17* | | | |
| 11 | Discontinue | 0.020 | 0.138 | 0.09* | 0.01* | 0.05* | 0.04* | 0.11* | -0.01* | 0.01* | 0.02* | 0.03* | 0.001 | | |
| 12 | Fear of Failure | 0.349 | 0.477 | -0.07* | -0.10* | -0.05* | -0.02* | -0.13* | -0.001 | -0.03* | -0.001 | 0.03* | 0.08** | -0.03* | |
| 13 | Network | 0.237 | 0.425 | 0.15* | -0.15* | 0.09* | 0.24* | 0.21* | -0.04* | -0.01* | .04* | 0.14* | 0.14* | 0.08* | -0.01 |

* p<0.01

31% of the respondents could identify opportunity and 47% perceived that they have sufficient skill to start a business. 28% of the respondents completed graduation or above level education and 24% of the respondents know an entrepreneur who has started a business in last two years. 70% of the respondents are in either full time or part-time employment. 35% respondents said that fear of failure will prevent them to start a business.

In serial entrepreneurship table- shows that there is no multicollinearity problem among the variables. Discontinuity, age, and skill have moderate correlation with serial entrepreneurship. The

correlation between serial entrepreneurship and the remaining variables are poor. The descriptive statistics show that 31% respondents are serial entrepreneurs. The demographic characteristics of the respondents are: a) average age is 43 years b) 60% are male c) 93% are white d) 64% are living in England e) 10% are Immigrant.

Table-2: Descriptive Statistics for Serial Entrepreneurship

| SL NO | Variable | Mean | S.D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-------|-------------------------|-------|-------|--------|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|
| 1 | Serial Entrepreneurship | 0.31 | 0.46 | - | | | | | | | | | | | |
| 2 | Age1870 | 42.50 | 11.40 | 0.20** | | | | | | | | | | | |
| 3 | Male | 0.60 | 0.49 | 0.09** | 0.02** | | | | | | | | | | |
| 4 | Opportunity | 0.61 | 0.49 | -0.01 | 0.09** | 0.09** | | | | | | | | | |
| 5 | Skill | 0.84 | 0.37 | 0.19** | -0.01 | 0.20** | 0.20** | | | | | | | | |
| 6 | White | 0.93 | 0.25 | 0.01 | 0.15** | 0.01** | 0.03** | 0.02** | | | | | | | |
| 7 | England | 0.64 | 0.48 | 0.03 | 0.03** | 0.01** | 0.02** | 0.02** | -0.10** | | | | | | |
| 8 | Immigrant | 0.10 | 0.30 | 0.04* | 0.09** | 0.01** | 0.04** | 0.03** | -0.46** | 0.07** | | | | | |
| 9 | Graduate | 0.42 | 0.49 | 0.03 | 0.11** | 0.04** | 0.13** | 0.14** | -0.08** | -0.002 | 0.12** | | | | |
| 10 | Employment | 0.85 | 0.36 | 0.04* | 0.30** | 0.08** | 0.11** | 0.17** | -0.001* | 0.001 | 0.02** | 0.17** | | | |
| 11 | Discontinue | 0.07 | 0.26 | 0.24** | 0.01** | 0.05** | 0.04** | 0.11** | -0.01** | 0.01** | 0.02** | 0.03** | 0.001 | | |
| 12 | Fear of Failure | 0.23 | 0.42 | 0.06** | 0.10** | 0.05** | 0.02** | 0.13** | -0.001 | 0.03** | -0.001 | 0.03** | 0.08** | 0.03** | |
| 13 | Network | 0.53 | 0.50 | 0.07* | -0.15* | 0.09* | 0.24* | 0.21* | -0.04* | -0.01* | 0.04* | 0.13* | 0.14* | 0.08* | -0.001 |

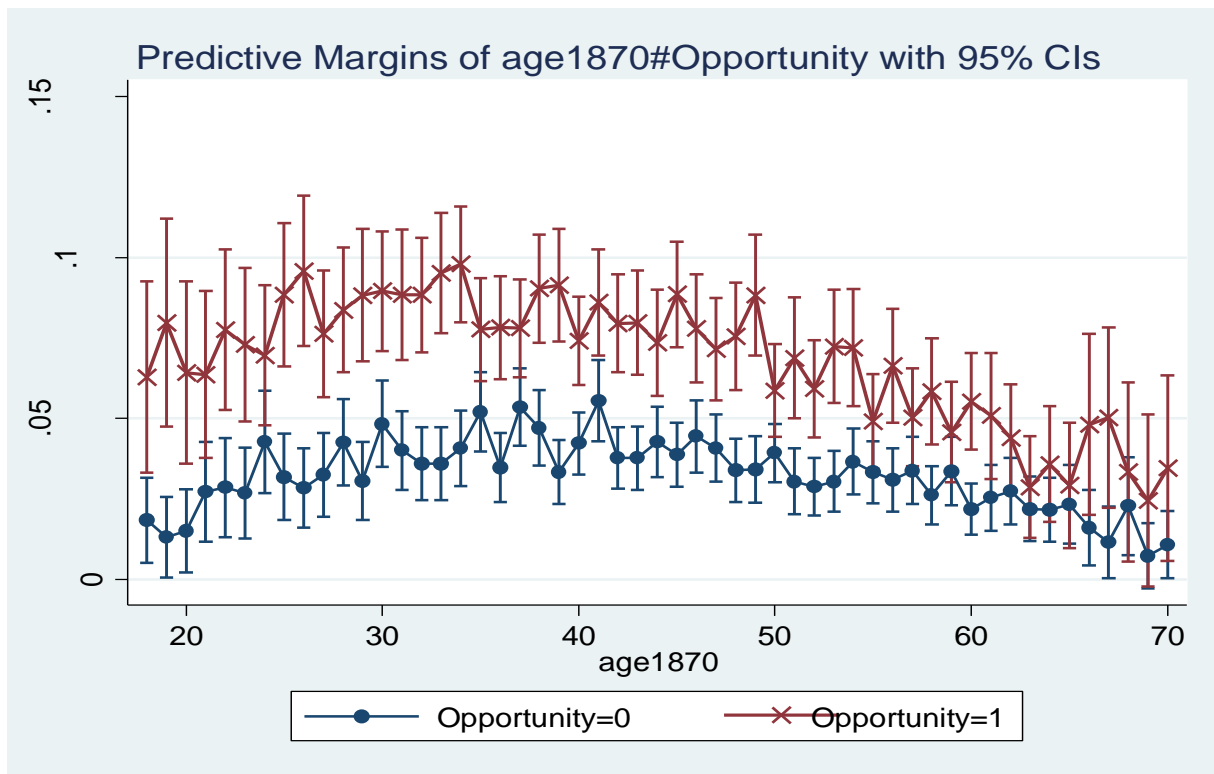
** p<0.01, * p<0.05

Cognitive and other non-cognitive characteristics of the respondents show that: a) 61% identified opportunity in the last six months b) 84% perceived that they have sufficient skill to start a business c) 23% stated that fear of failure will prevent them to start a business, d) only 7% discontinued a business in the last 12 months. e) 53% know a businessman who has started a business in the last two years. f) 42% have graduate or above level of education and g) 85% of the respondents were employed either full time or part time.

RESULT:

The results prove all 4 hypotheses. Margin analysis of interaction of opportunity and age1870 (exact age of respondents from 18 to 70 years) shows that the influence of opportunity to be involved in early stage entrepreneurship is growing during the age of young adult, remain stable in the middle age and decline in the old age.

Figure-2: Margin Analysis of Interaction of Opportunity identification and Age in Early Stage Entrepreneurial Activity



The predictive margin shows that identifying opportunity can ensure almost 7% probability of involving in early stage entrepreneurial activity until middle age. This probability declines to under 5% in the old age when the influence of identifying opportunity or failure to identify an opportunity has same kind of influence in entrepreneurial activity.

Table-3a: Interaction Effects of Opportunity & Age Groups in Early stage Entrepreneurial Activity

| Hypothesis 1 | | 0 1 - 0 0 | 1 1 - 1 0 |
|------------------------------|----------------------|----------------------|----------------------|
| Early Stage Entrepreneurship | Opportunity#Age1835 | .0035* (.0019) | .0297*** (.0062) |
| | Opportunity#Age5670 | -.0198*** (.0015) | -.0809*** (.0050) |
| | Opportunity#Age1835a | -.0048** (.0021) | .0037 (.0067) |

Table-3b: Interaction Effects of Opportunity & Age Groups in Serial Entrepreneurial Activity

| Hypothesis 2 | | 0 1 - 0 0 | 1 1 - 1 0 |
|-------------------------|----------------------|----------------------|----------------------|
| Serial Entrepreneurship | Opportunity#Age1835 | -.3682*** (.1094) | -.3637*** (.0845) |
| | Opportunity#Age5670 | .9121*** (.3439) | .6189*** (.2265) |
| | Opportunity#Age1835a | -.2139** (.0994) | -.2643*** (.0795) |

The table shows the marginal effect as the difference in differences between the expected odds of opportunity of different age groups. The probability of involving in early stage entrepreneurial activity is 3% more for young adult than other two age groups if they can recognise opportunity. The influence is highly significant. This rate is only 0.3% more for young adult than other two age groups if they fail to recognise the opportunity. The reason of the difference between two rates is that the multiplicative effects are relative to the baseline odds in their own category. On the other hand, the probability of involving in early stage entrepreneurial activity is 8% less for old people than other two age groups if they can identify the opportunity. This highly significant result shows that opportunity identification matters for young adult and middle aged people in comparison to the old people. The probability of involving in early stage entrepreneurial activity is only 0.4% more for young adult than middle aged people. But the result is insignificant. These reveal that

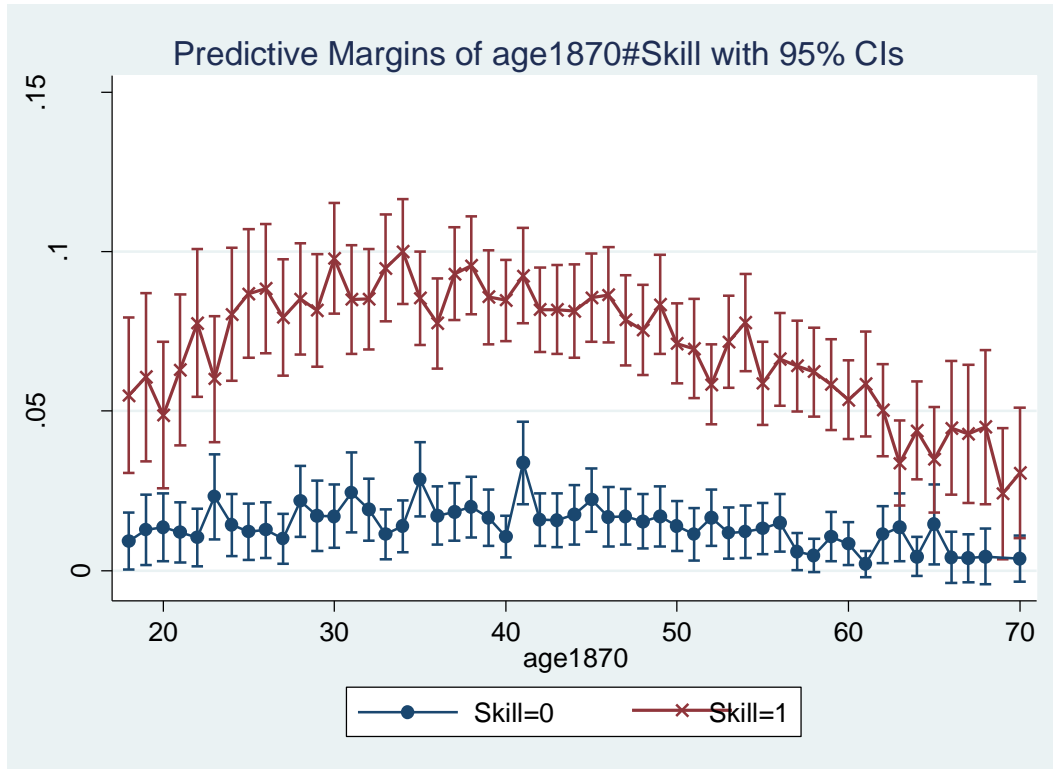
there is no significant difference between young adult and middle aged people to involve in early stage entrepreneurial activity based on opportunity identification.

However, In case of serial start-up the above situation, use of opportunity by different age groups in entrepreneurship, is simply reverse. The probability of starting up another business is 36% less for young adults than other two age groups if they can identify the opportunity. The result was almost same even if they can't see the opportunity. The probability of starting another business for old people is 62% more for old people than middle age or young adult if they can identify an opportunity. This highly significant result shows that old people can use their opportunity in the best way if they are already in entrepreneurship career. However, in case when people cannot see the opportunity, old people have the 91% more probability to start another business than other two lower age groups. This may be because of their business network with other entrepreneurs or potential entrepreneurs. Young adult has 26% less probability than middle age people if they can identify the opportunity. In comparison to middle age people young adults have 21% less probability to start another business if they failed to recognise the opportunity. The above findings reveal that the influence of opportunity is sharply increasing with growing age in serial start-up entrepreneurship.

In figure-3, the margin of interaction of skill and age shows that the influence of skill is growing with growing age in the young adult. This influence maintains in the middle age and declines in the old age. There is no age difference in the influence if the skill is insufficient ($skill=0$) and the probability of involving in the early stage entrepreneurship is almost zero. Age changes from 18

years to 60 years are contributing from 5% to 10% probability of involving in early stage entrepreneurship if the respondents have sufficient skills to start a business. This contribution drops down under 5% after the age 60.

Figure-3: Interaction Effect of skill and Age after Marginal Analysis:



Interaction effects (difference in differences) of skill and age groups are given in the table-4. The results show (table-4a) that the influence of skills in early stage entrepreneurship decreases with growing age. The marginal affect of interaction between skill and age1835 shows that the probability of involving in early stage entrepreneurial activity is almost 4% more for young adults than other two age groups if they have skill. This probability is only 0.5% more for young adult than other two age groups if they do not have skill to start a business. The interaction between skill and age1835a compares young adult to middle age group having skill or not having skill. Young adult having skill will have 1.54% more potential to be involved in

early stage entrepreneurial activity than middle age people having skill. There is no significant difference between young adult and middle age people having insufficient skill to be involved in early stage entrepreneurial activity. The probability of old people having skill to involve in early stage entrepreneurial activity is 7% less than two other age groups having skill. The findings show that age matters for skill. The differences are significant.

Table-4a: Interaction Effects of Skill & Age Groups in Early stage Entrepreneurial Activity

| Hypothesis 3 | | 0 1 - 0 0 | 1 1 - 1 0 |
|------------------------------|----------------|----------------------|----------------------|
| Early Stage Entrepreneurship | Skill#Age1835 | .0046*** (.0012) | .0392*** (.0050) |
| | Skill#Age5670 | -.0092*** (.0009) | -.0739*** (.0037) |
| | Skill#Age1835a | .0011 (.0014) | .0154*** (.0055) |

Table-4b: Interaction Effects of Skill & Age Groups in Serial Entrepreneurial Activity

| Hypothesis 4 | | 0 1 - 0 0 | 1 1 - 1 0 |
|-------------------------|----------------|-------------------|----------------------|
| Serial Entrepreneurship | Skill#Age1835 | -.0825 (.0573) | -.3928*** (.0815) |
| | Skill#Age5670 | .2844 (.2004) | .7637*** (.2277) |
| | Skill#Age1835a | -.0481 (.0550) | -.2631*** (.0737) |

In serial entrepreneurship (table-4b), old people are using skills more substantially than other two lower age groups. There is 76% more probability for old people than other two age groups if they have skills. In serial entrepreneurship, the influence of skill is 40% less for young adult than other two age groups. The influence of skill is 26% less for young adult than middle age people. The interactions between insufficient skill (skill=0) and age groups are insignificant in serial entrepreneurship. The results are very interesting. Influence of skill is growing with growing age in serial entrepreneurship. On the other hand, the influence of skill is declining with growing age in early stage entrepreneurship. These findings proved our hypotheses 3 and 4. Another interesting finding of the study is that the interaction effects of skill and age groups are insignificant in serial entrepreneurship when respondents have insufficient skill.

DISCUSSIONS

The study explained the direct effect and modifying effect of age groups on entrepreneurial activity. Age is influencing the entrepreneurial behaviour in one hand and modifying the influence of opportunity identification and skill in entrepreneurial behaviour on the other. More interesting finding is the reverse modifying influence of age on opportunity identification and skill in the early stage entrepreneurial activity and in serial entrepreneurial activity. The findings show that the influence of opportunity is modified by different age groups significantly in the early stage entrepreneurial activity. The positive coefficient of interaction between opportunity and age1835 represent that opportunity identification is more important for young adult than the other two age groups. The dummy variable age1835 represent young adult in comparison to middle age and old age people. The dummy variable age1835a represents young adult in comparison to middle age only. On the other hand, the dummy variable age5670 represents old age people in comparison to the middle age and young adult. Cognitive life cycle theory supports our findings on interaction between age groups and opportunity. Young adults are more influenced by opportunity than the other two age groups. As per cognitive life cycle theory, this is the result of agility principle in the young age. At this age young adult have few options for life course and less information in their memory. So, information processing speed is very high in the early stage of the professional life. Since options are few, information processing speed is the highest, young adults are attracted more to the stimulus, here opportunity.

However, in serial entrepreneurship, old people are influenced more by opportunity identification than other two age groups. This is exception to general life span cognitive analysis. This exception

is explained by new disuse theory. As per new disuse theory, periodical recall of stored information increases the processing speed. People those who are already in the entrepreneurship, their life course become limited and focused. Though there is age related decline in the old age, the information processing speed is higher than other age groups for above two reasons. As a result, influence of opportunity in serial start-up is higher for old age people. The interaction effect of age groups to no opportunity identification shows that the probability of old people to be involve in serial entrepreneurial activity is 90% more than other two age groups when they fail to identify an opportunity. This may be because of social network effect in the old age for serial entrepreneur. An old entrepreneur may be failed to find opportunity himself but he may involve in serial start-up more easily than other two age groups if an opportunity is identified by his social or business network. However, further research need to be conducted to confirm the reason.

The study exposed an opposite trend in the use of skill by different age groups in early stage entrepreneurial activity and in the serial entrepreneurship. Our result shows that young adults are more influenced by skill than other two age groups in the early stage entrepreneurial activity. This finding is consistent with the agility principle of young age of life span cognitive psychology. However, a highly significant positive influence of skill in the age of young adult over middle age people may seem inconsistent with maintenance principle in the middle age. We were expecting a positive but insignificant result. This would confirm the maintenance principle. A possible explanation is that skill of young adult is maintained at middle age but gaining more skills in other areas over the years reduces the effectiveness of entrepreneurial skill. The interaction of having insufficient skill with age groups show that young adult has a significant but very minor influence

on the influence of skill over other age groups. There is no significant difference in the influence of skill between young adult and middle age groups.

In serial entrepreneurship, old people are using skill more efficiently than other two age groups. The findings show that the influence of skill is increasing with growing age. This finding is supported by new disuse theory. The theory explained that repeated use or periodical use of same skill increases the retrieval efficiency. The coefficient of interaction effect of skill and age1835 is $-.3928$ which is lower than the coefficient of interaction effect of skill and age1835a. Variable age35a represents young adult in comparison to middle age people. This indicates that in serial entrepreneurship, the influence of skill is increasing with growing age. The insignificant interaction effects between insufficient skill and age groups in serial entrepreneurship further amplify the use of skills with growing age in serial entrepreneurship.

CONCLUSION:

We studied how age related cognitive conditions influence opportunity identification and skill in early stage entrepreneurial activity and in serial entrepreneurship. We found that cognitive condition of young adult modify the influence of opportunity identification highly significantly over other two age groups. However, when we compare young adult with middle age in the modification of the influence of opportunity, we did not find any significant difference. This indicates the influence remain same until middle age after which it declines. These findings are

supported by life span cognitive theory. The influence of cognitive condition of age is reverse in case of serial entrepreneurship. In serial entrepreneurship, the cognitive conditions of old people modify the influence of opportunity identification highly significantly over other two age groups. This difference remains when we compare young adult with middle age. This means in serial entrepreneurship cognitive condition improves and this improving cognitive condition modifies opportunity identification positively with growing age.

In the interaction of skill and age groups, we found that cognitive condition of age groups positively modifies the skill in start-up process in early stage entrepreneurial activity in the young adult age after which the influence decline sharply. This result is similar to the argument of disuse theory. On the other hand, in serial entrepreneurship the influence cognitive condition to modify the skill is highest at old age. These findings reveal that in serial entrepreneurship with growing age the influence of cognitive condition positively increasing to modify the influence of skills in serial start up, which is the result of enhanced efficiency of skill as of repeating representation. Since there is no agreed definition of age groups we analyse the sensitive of age groups by changing the definition of age groups and found that there is a significant change in the result for young adult in modifying the influence of opportunity identification. In all other interaction, there were some changes in the magnitude of influence.

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Appendix:

Table-3: Logit Regression of Early Stage Entrepreneurial Activity

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|--------------------------|---------------------------|--------------------------|-----------------------|-----------------------|-----------------------|-------------------------|-----------------------|-----------------------|-----------------------|
| age1870 | 0.0841*** (0.00972) | -0.00878*** (0.00205) | | | | -0.0122*** (0.00355) | | | |
| age1870sq | -0.00114*** (0.000113) | | | | | | | | |
| Male | 0.274*** (0.0335) | 0.250*** (0.0334) | 0.238*** (0.0334) | 0.259*** (0.0335) | 0.266*** (0.0360) | 0.250*** (0.0334) | 0.237*** (0.0334) | 0.258*** (0.0335) | 0.266*** (0.0360) |
| Graduate | 0.0926*** (0.0340) | 0.107*** (0.0340) | 0.106*** (0.0340) | 0.104*** (0.0340) | 0.0391 (0.0368) | 0.104*** (0.0340) | 0.103*** (0.0340) | 0.102*** (0.0340) | 0.0368 (0.0368) |
| Fear of Failure | -0.667*** (0.0408) | -0.647*** (0.0407) | -0.631*** (0.0407) | -0.653*** (0.0407) | -0.686*** (0.0433) | -0.647*** (0.0407) | -0.631*** (0.0407) | -0.653*** (0.0407) | -0.686*** (0.0433) |
| Employment | 0.812*** (0.0538) | 0.961*** (0.0523) | 1.031*** (0.0516) | 0.896*** (0.0532) | 0.605*** (0.0584) | 0.957*** (0.0523) | 1.030*** (0.0516) | 0.890*** (0.0532) | 0.606*** (0.0584) |
| Network | 0.634*** (0.0338) | 0.639*** (0.0338) | 0.664*** (0.0337) | 0.643*** (0.0337) | 0.632*** (0.0363) | 0.638*** (0.0338) | 0.662*** (0.0337) | 0.643*** (0.0337) | 0.631*** (0.0362) |
| Immigrant | 0.0465 (0.0643) | 0.0558 (0.0641) | 0.0560 (0.0644) | 0.0543 (0.0643) | 0.0734 (0.0674) | 0.0564 (0.0641) | 0.0576 (0.0643) | 0.0545 (0.0643) | 0.0749 (0.0674) |
| White | -0.264*** (0.0735) | -0.244*** (0.0734) | -0.303*** (0.0735) | -0.273*** (0.0731) | -0.250*** (0.0752) | -0.244*** (0.0733) | -0.300*** (0.0734) | -0.273*** (0.0730) | -0.248*** (0.0751) |
| England | 0.00539 (0.0343) | 0.00625 (0.0342) | -0.00109 (0.0342) | 0.00248 (0.0342) | 0.0151 (0.0370) | 0.00568 (0.0342) | -0.00179 (0.0342) | 0.00285 (0.0342) | 0.0142 (0.0370) |
| Discontinue | 0.992*** (0.0689) | 0.995*** (0.0687) | 0.981*** (0.0686) | 0.986*** (0.0688) | 0.951*** (0.0769) | 0.996*** (0.0687) | 0.980*** (0.0686) | 0.984*** (0.0687) | 0.950*** (0.0769) |
| Opportunity | 0.808*** (0.0338) | | | | | 0.813*** (0.0338) | 0.823*** (0.0337) | 0.816*** (0.0337) | 0.844*** (0.0366) |
| Skill | 1.745*** (0.0506) | 1.769*** (0.0506) | 1.755*** (0.0506) | 1.754*** (0.0506) | 1.736*** (0.0538) | | | | |
| 1.Opportunity | | 1.086*** (0.119) | 0.765*** (0.0399) | 0.836*** (0.0365) | 0.775*** (0.0449) | | | | |
| 1.Opportunity#c.Age1870 | | -0.00645** (0.00269) | | | | | | | |
| 1.Age1835 | | | 0.0259 (0.0577) | | | | 0.123 (0.0970) | | |
| 1.Opportunity#1.Age1835 | | | 0.198*** (0.0728) | | | | | | |
| 1.Age5670 | | | | -0.425*** (0.0685) | | | | -0.714*** (0.146) | |
| 1.Opportunity#1.Age5670 | | | | -0.129 (0.0924) | | | | | |
| 1.Age1835a | | | | | -0.0831 (0.0596) | | | | -0.0361 (0.100) |
| 1.Opportunity#1.Age1835a | | | | | 0.198*** (0.0754) | | | | |
| 1.Skill | | | | | | 1.780*** (0.164) | 1.745*** (0.0621) | 1.723*** (0.0536) | 1.702*** (0.0685) |
| 1.Skill#c.Age1870 | | | | | | -0.000273 (0.00381) | | | |
| 1.Skill#1.Age1835 | | | | | | | 0.0271 (0.104) | | |
| 1.Skill#1.Age5670 | | | | | | | | 0.246 (0.153) | |
| 1.Skill#1.Age1835a | | | | | | | | | 0.0857 (0.108) |
| Constant | -6.533*** (0.210) | -4.974*** (0.134) | -5.363*** (0.103) | -5.184*** (0.102) | -4.877*** (0.109) | -4.821*** (0.177) | -5.386*** (0.106) | -5.139*** (0.103) | -4.887*** (0.114) |
| Pseudo R2 | 0.1852 | 0.1824 | 0.1806 | 0.1832 | 0.1674 | 0.1822 | 0.1804 | 0.1832 | 0.1672 |
| Observations | 86,670 | 86,670 | 86,670 | 86,670 | 63,495 | 86,670 | 86,670 | 86,670 | 63,495 |

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table-4: Logit Regression of Serial Entrepreneurial Activity

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|--------------------------|-------------------------|------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Age1870 | 0.0672 (0.0411) | 0.0431*** (0.00961) | | | | 0.0383** (0.0186) | | | |
| Age1870sq | -0.000296 (0.000467) | | | | | | | | |
| Male | 0.0969 (0.131) | 0.0881 (0.130) | 0.151 (0.129) | 0.0880 (0.129) | 0.0767 (0.141) | 0.0882 (0.130) | 0.150 (0.129) | 0.0864 (0.129) | 0.0757 (0.141) |
| Graduate | -0.00764 (0.130) | -0.00452 (0.130) | 0.0260 (0.128) | 0.0214 (0.128) | 0.144 (0.141) | -0.00676 (0.130) | 0.0268 (0.128) | 0.0281 (0.128) | 0.145 (0.141) |
| Fear of Failure | -0.196 (0.157) | -0.192 (0.157) | -0.196 (0.155) | -0.176 (0.155) | -0.191 (0.172) | -0.193 (0.157) | -0.196 (0.155) | -0.175 (0.155) | -0.190 (0.172) |
| Employment | 0.310 (0.191) | 0.328* (0.189) | 0.231 (0.185) | 0.294 (0.186) | 0.530** (0.229) | 0.328* (0.189) | 0.229 (0.185) | 0.302 (0.186) | 0.529** (0.229) |
| Network | 0.190 (0.129) | 0.188 (0.129) | 0.167 (0.128) | 0.131 (0.127) | 0.188 (0.141) | 0.187 (0.129) | 0.161 (0.128) | 0.130 (0.127) | 0.180 (0.141) |
| Immigrant | 0.330 (0.224) | 0.326 (0.224) | 0.329 (0.222) | 0.279 (0.221) | 0.334 (0.234) | 0.328 (0.224) | 0.329 (0.222) | 0.276 (0.221) | 0.333 (0.234) |
| White | -0.0369 (0.279) | -0.0281 (0.278) | 0.00116 (0.276) | 0.114 (0.274) | -0.179 (0.282) | -0.0281 (0.278) | 0.00620 (0.277) | 0.116 (0.275) | -0.172 (0.282) |
| England | 0.167 (0.132) | 0.171 (0.132) | 0.139 (0.130) | 0.159 (0.130) | 0.0884 (0.144) | 0.171 (0.132) | 0.138 (0.130) | 0.160 (0.130) | 0.0862 (0.144) |
| Discontinue | 1.688*** (0.240) | 1.676*** (0.239) | 1.711*** (0.237) | 1.610*** (0.234) | 1.518*** (0.263) | 1.675*** (0.239) | 1.709*** (0.237) | 1.606*** (0.234) | 1.509*** (0.263) |
| Opportunity | -0.00208 (0.130) | | | | | -0.00343 (0.130) | -0.0268 (0.128) | -0.0757 (0.128) | -0.0307 (0.142) |
| Skill | 1.219*** (0.229) | 1.222*** (0.229) | 1.229*** (0.228) | 1.259*** (0.228) | 1.293*** (0.255) | | | | |
| 1.Opportunity | | 0.120 (0.549) | -0.0646 (0.144) | -0.0949 (0.140) | -0.0823 (0.165) | | | | |
| 1.Opportunity#c.Age1870 | | -0.00276 (0.0119) | | | | | | | |
| 1.Age1835 | | | -0.922*** (0.270) | | | | -0.862* (0.501) | | |
| 1.Opportunity#1.Age1835 | | | 0.186 (0.322) | | | | | | |
| 1.Age5670 | | | | 0.662*** (0.257) | | | | 1.184** (0.548) | |
| 1.Opportunity#1.Age5670 | | | | 0.127 (0.336) | | | | | |
| 1.age18351 | | | | | -0.828*** (0.278) | | | | -0.645 (0.523) |
| 1.Opportunity#1.Age18351 | | | | | 0.207 (0.331) | | | | |
| 1.Skill | | | | | | 1.075 (0.886) | 1.211*** (0.260) | 1.341*** (0.254) | 1.306*** (0.303) |
| 1.Skill#c.Age1870 | | | | | | 0.00336 (0.0195) | | | |
| 1.Skill#1.age1835 | | | | | | | 0.0741 (0.524) | | |
| 1.Skill#1.Age5670 | | | | | | | | -0.490 (0.573) | |
| 1.Skill#1.Age18351 | | | | | | | | | -0.0444 (0.546) |
| Constant | -4.819*** (0.936) | -4.395*** (0.598) | -2.248*** (0.408) | -2.680*** (0.406) | -2.479*** (0.450) | -4.180*** (0.915) | -2.252*** (0.422) | -2.778*** (0.419) | -2.522*** (0.473) |
| Pseudo R2 | 0.1013 | 0.1011 | 0.0874 | 0.0811 | 0.0799 | 0.1010 | 0.0873 | 0.0814 | 0.0797 |
| Observations | 1,373 | 1,373 | 1,373 | 1,373 | 1,174 | 1,373 | 1,373 | 1,373 | 1,174 |

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1