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RESEARCH ARTICLE

The career history of Chinese entrepreneurs and their life outcomes: a life history study using sequence analysis

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Chinese entrepreneurs, whose population has been steadily growing since the Reform and Open Up in 1978, are a diverse group of people. Though previous research has analysed Chinese entrepreneurs by special cases, few have conducted a nationally representative study of their typology. And even fewer have analysed the life outcomes of the different types of entrepreneurs. Relying on two waves of the panel data from the China Health and Retirement Longitudinal Study (CHARLS) and with the technique of sequence analysis, for the first time, we explored the heterogeneous career trajectories of Chinese entrepreneurs and their corresponding life outcomes. We successfully depicted four unique entrepreneurial trajectories in China since the 1950s, which are necessity entrepreneurs, employee entrepreneurs, persistent entrepreneurs and farmer entrepreneurs. Our empirical results can support both the cumulative disadvantage theory and the set-point theory in health-related studies. Among all the entrepreneurs, farmer entrepreneurs have the worst self-rated health in the long run, which supports the cumulative disadvantage theory. At the same time, all types of entrepreneurs have similar depressive symptoms and economic returns, which supports the set-point theory.

Key words entrepreneurship • life history • health • sequence analysis • life outcomes

Key messages

- This is the first study analysing the life history of Chinese entrepreneurs.
- It is one of the first articles to examine the health outcomes of Chinese entrepreneurs.
- Employing sequences analysis, we successfully identified four distinct groups of Chinese entrepreneurs based on their employment history.

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Introduction

The transformation from a planned economy to a more market-oriented economy in China in the 20th century has encouraged the emergence of a special group of people – Chinese entrepreneurs. The continuous rise of entrepreneurship in China since the late 1970s has incited mixed commentaries. Some scholars argue that self-employment, especially in rural China, is part of a less productive informal sector and a forced option for unskilled or less-educated workers (Gong and van Soest, 2002). At the same time, other scholars have found clear evidence that self-employment in rural China is productive and shares many features of the formal small business sector found in developed countries. Therefore, just as any country that has transformed from a planned economy to a market economy (Szelényi, 1988), China witnessed this heterogeneous group of entrepreneurs who shifted to entrepreneurship from different social and economic backgrounds.

Focusing on the pre-entrepreneurial job of Chinese entrepreneurs in the 1990s and using the data from the first wave of a survey on private enterprises in China in 1994, Li (1998) pointed out the heterogeneous nature of the first batch of Chinese entrepreneurs, who mainly consisted of: (1) professionals (3.31%); (2) cadres and managerial staff from previous state-owned enterprises (SOEs), rural sectors or non-public sectors (44.79%); (3) common employees (19.92%); and (4) laid-off workers, farmers, unemployed people from relatively lower social strata, and others (31.99%). Since the survey only covered private Chinese enterprises that had reached certain economies of scale and were already registered, it left solo-employed Chinese entrepreneurs, comprising a large portion of the population, out of the sample. Additionally, the survey mainly focused on the outcomes of enterprises instead of the entrepreneurs themselves. Therefore, a more updated study analysing Chinese entrepreneurs' life outcomes is urgently needed.

Recently, with an even more marketised economy coupled with education expansion, Chinese entrepreneurs became more diverse with an injection fresh college graduates and overseas returnees, though as a growing group of people Chinese entrepreneurs have only attracted limited scholarly attention. Under the 'mass entrepreneurship' call from the State Council, it is now important to analyse this group's demographic composition and career trajectories (2015; see also Ministry of Agriculture and Rural Affairs, 2017). Echoing the development aim of the state, our research uses detailed life history data to empirically discern different pathways towards entrepreneurship.

In addition to the typology of Chinese entrepreneurs, this paper will also explore the diverse social and economic consequences of each entrepreneurial path. The cumulative advantage theory and the set-point theory are the principal frameworks for exploring career trajectories' long-term association with entrepreneurial health. As will be further explored in the literature review section, cumulative advantage theory argues that one's life outcome is a cumulative process in which positive experiences in an early stage might be associated with one's health at older ages (Dannefer, 2003).

Therefore, an entrepreneur's life outcome is a combined result of a person's early and current career paths, and the former might be even more important. In contrast, the set-point theory argues that changes in life outcomes as a result of the transition in career paths might only be temporary – for example, early adversity would fade out in the long run (Georgellis and Yusuf, 2016). In this regard, one's current occupation status plays a crucial role in terms of life outcomes. In the case of Chinese entrepreneurs, we may rely on these theories to explore how their career trajectories may be associated with their overall life outcomes.

Understanding entrepreneurship in China is important due to the Chinese conservative cultural background that generally values stability over autonomy, which makes it an interesting case to test previous empirical findings in Western countries. This feature may differentiate China from the more common entrepreneurial patterns in Western countries. Valuing stability well explains why keeping an 'Iron Rice Bowl' (working for an SOE) is still a preferred choice, even if China's economic reform has taken place for more than 40 years (Wang and Xie, 2015). Nevertheless, entrepreneurship has been identified as a key driver for China's fast-growing economy since the 1990s.

Taking all this together, we explore the following two questions in our research:

1. What were the major career pathways before picking up entrepreneurship in China in the past 50 years, that is, what is the typology of Chinese entrepreneurs?
2. What are the likely life outcomes of different types of Chinese entrepreneurs, that is, health outcomes and economic outcomes?

Addressing the typology of Chinese entrepreneurship and its life outcomes can give us a better understanding of different employment trajectories towards self-employment and their corresponding likelihoods for success. Possibly due to data limitations, previous research rarely explored Chinese entrepreneurship from a life history perspective. Relying on two waves of the panel data from the China Health and Retirement Longitudinal Study (CHARLS) and with the technique of sequence analysis, for the first time, we explored the heterogeneous career trajectories of Chinese entrepreneurs and their life outcomes.

Literature review

Before proceeding further, we would like to define 'entrepreneurs' in this study. In short, entrepreneurs here include both self-employed people and employers. For example, an owner of an ice-cream parlour, a manufacturer running his own factory and an employer operating international trade are all within our analytical sample. Previous research has also adopted a wider definition of entrepreneurship, ranging from extremely successful business owners to self-employed small business vendors (Noseleit, 2010). Therefore, in this article, entrepreneurship and self-employment are coterminous.

Transitions between various employment states are quite common in people's life histories, whose frequency can be exceptionally high when the societal socio-economic infrastructure is undergoing revolutionary changes (Szelényi, 1988). While the different activity statuses are already common knowledge (being employed, self-

employment, unemployed, military service, out of workforce), we know comparably little about how self-employment as a unique activity status may interact with other activity statuses. More specifically, since self-employment is not a popular economic status in terms of population participation, it is interesting to discover how other activity statuses may come before self-employment, if at all.

Most research has treated self-employment as a separate state and has not embedded it well into one's whole employment history. In this way, our knowledge of the life outcomes of entrepreneurship is still quite limited, especially those in developing countries. More importantly, by embedding these trajectories in unique historical and social backgrounds, that is, the fast-developing decades in China after its Reform and Open Up in 1978, we can better understand how societal factors are associated with individuals' career choices.

To better depict a comprehensive picture of Chinese entrepreneurship, we first review the typology of entrepreneurial trajectories and then the potential life outcomes of each trajectory.

Typology: different entrepreneurial trajectories

Employment trajectories are a rising field of academic research. At this moment, scholars have mainly looked at employment trajectories and their life outcomes in Western countries, such as Germany and the US (Steinmetz and Wright, 1989; Schuring et al, 2015; Koch et al, 2021). In Germany, persistent self-employment careers have higher gross labour income and exhibit higher job and life satisfaction than all other self-employment career patterns, which were mixed self-employment, intermittent self-employment and necessity self-employment (Koch et al, 2021). Drawing on the UK Labour Force Survey, scholars confirmed that women are often constrained by the complex demands of work life and family life, and motherhood appears to be the key stimulus to career transition towards self-employment. In fact, scholars discovered two distinct cohorts of self-employed women: academically qualified women in managerial roles working longer than the average workweek and unqualified women who work shorter hours (Brindley et al, 2014). Using the European Community Household Panel (ECHP), scholars confirmed that employment transitions, such as being in or out of the workforce due to early retirement, unemployment or economic inactivity, were associated with one's health (Schuring et al, 2015).

Most research has described the general trend of the fluctuation of the tendency for self-employment from a national level (Szelényi, 1988; Steinmetz and Wright, 1989), while limited research, owing to the increasing popularity of sequence analysis, has empirically analysed the career trajectories before self-employment (Koch et al, 2021). For example, using data on the Dutch labour force and applying sequence and cluster analysis, scholars revealed three major career profiles of self-employed individuals: mixed self-employment careers that combine self-employment with wage-employment, stable self-employment and precarious self-employment (Bay and Koster, 2022).

Describing an individual's holistic work history is important, as individuals' decisions for any specific economic activity are closely intertwined with the bigger socio-economic background. Taking self-employment as a specific economic activity per se, a brief review of the historical trends of self-employment in several countries shows

that the ups and downs of entrepreneurs are often associated with economic reform in the wider context. For example, in Hungary, entrepreneurship rose in the early 1980s, approximately ten years after the nationwide economic reform that took place in the late 1960s. Hungary's superiority and the rationale of the centrally planned system had been questioned as early as the mid-1950s. After the suppressed revolution that initiated systemic changes of 1956, a comprehensive economic reform of 1968 emerged as an attempt to combine both the planned and the market economies, focusing on keeping state ownership dominant. However, such an economic reform itself could not well absorb the atmosphere and the pressure of the overall worsening economic situation of the country, which inspired and urged further innovative steps towards new driving forces to rejuvenate the economy. And the promotion and even legalisation of entrepreneurship, that is, private small business, were one of the measures (Román, 1991).

Also pointing to the connection between industrial decentralisation and the increase in self-employment, but shifting the location to the US, Steinmetz and Wright (1989) argued that an increase in self-employment can be expected due to the effect of new technologies in post-industrialism. As the market became more volatile and agile after decentralisation, small firms, with their flexible forms of production, can utilise new technology faster and thus adapt better than large-scale firms to fluctuating or low-demand markets.

Focusing on micro-level analysis, Humphries (2017) argues that individuals are also actively exploiting the opportunities in the market, whose entry and exit decisions for self-employment are closely tied to both labour-market dynamics and opportunity costs for individuals. For example, some people picked up self-employment with the aim of starting lasting businesses. In contrast, others may have entered self-employment as a form of marginal labour-force participation after a labour-market shock. Compared to the former, forced entrepreneurs might not last long in the job market. As shown by Carrasco's case in Spain, while unemployed people are more likely to enter self-employment, previous unemployment experience would also significantly increase the probability of leaving self-employment and the labour market altogether (Carrasco, 1999; see also Evans and Leighton, 1989).

Shifting away from developed Western countries, scholars have also looked at the dynamics of career mobility towards self-employment in developing countries – Mexico and Vietnam, for example. Aiming to explore the interaction between internal and external determinants for self-employment, scholars discovered the following four sets of push/pull forces: self-employment motivation and calling; career self-management; institution factor; and societal factor (Tran et al, 2021). Due to the limited job opportunities in the market as well as the stagnant economy on a larger scale, many Mexicans treated self-employment more as a transient career choice to pull themselves out of unemployment. Even if certain entrepreneurs derived personal satisfaction from their work, they also struggled to expand their businesses over time (Wassink and Hagan, 2018). Similar to the decentralisation process in several developed countries mentioned earlier, Vietnam was also undergoing societal changes that promoted entrepreneurship and the pull factors to leave SOEs. On the one hand, foreign investments were injected into the Vietnamese market, creating more lucrative opportunities outside SOEs and traditional farming activities. On the other, the repetitive employment work coupled with individuals' willingness to start entrepreneurship also explain the increase in entrepreneurship after being employed for some time.

Chinese context

Here we would like to bring out several typical types of Chinese entrepreneurs, which are revealed both by literature and by the CHARLS data. They are persistent entrepreneurs, employee entrepreneurs, farmer entrepreneurs and necessity entrepreneurs.

Persistent entrepreneurs

Persistent entrepreneurs refer to those long-lasting entrepreneurs who had either been self-employed throughout their work history or had quickly shifted to entrepreneurship at an early stage. This group of entrepreneurs might be the most diverse in terms of socio-demographic background. They could be rural dwellers who started their own businesses or urban dwellers who found self-employment to be a more lucrative career option, or who were not allocated a more stable job due to the industrial decentralisation in the 1980s. This close relation between economic reform and the rise of entrepreneurship in Vietnam and developed countries provides many insights into the Chinese context, whose substantial increase in entrepreneurship also took place after the Reform and Open Up. Under Deng Xiaoping's leadership, the Reform and Open Up policy in China in 1978 shifted the focus of the Chinese Communist Party from class struggle to economic development. The economic disarray due to the Cultural Revolution (1966–76) exacerbated the material shortage under the socialist economy, which urgently needed decollectivisation to produce and allocate resources effectively. Several institutional reforms propelled the decollectivising process. On the one hand, the Party removed Party cadres from the day-to-day management of firms, who were responsible for their own profit and loss. To further enliven the competitiveness of smaller collective firms, the government leased them out to individuals or groups to run these enterprises as if they were privately owned (Lockett, 1986). On the other hand, also starting in 1978, approximately 17 million youths sent to the countryside during the Cultural Revolution came back to cities. Since they had shifted their household registrations outside cities during the Down to the Countryside Movement, their jobs back in the cities were no longer the responsibility of the local governments. At the same time, the severe overstaffing within the state enterprises also resulted in at least 26 million unemployed urbanites in 1981 (Zafanolli, 1985). Therefore, the governments encouraged these people to be individual entrepreneurs to lessen the government's financial burden and solve the employment slack. In the 1980s, while some 'set-down' youths returned to urban areas to reunite with families, a few stayed in rural China to further utilise the social capital accumulated during the Down to the Countryside Movement. In fact, together with the local cadres in rural China, these people became the first batch of Chinese entrepreneurs right after the Reform and Open Up (Nee, 1988). Some of these people engaged in entrepreneurship throughout their lives and became the persistent entrepreneurs revealed by the CHARLS data.

Employee entrepreneurs

Employee entrepreneurs mainly include two groups of people: previous cadres or professionals, and previously dismissed workers from collective enterprises. Later in

the 1990s, after the success of the early transformation of some collective enterprises, some previous cadres and managerial staff also joined entrepreneurship for higher economic return. According to the survey data on Chinese entrepreneurs since 1993, the representation of previous cadres and managerial staff was considerably much higher than any other type of entrepreneurs, whose proportion was raised to more than 40% in the 1990s (Lulu, 1998). Though people may argue that this earlier phase of Chinese entrepreneurs only represented an 'internal circulation' among those with established social capital, the presence of Chinese entrepreneurs coming from humbler social and economic foundations also shows that entrepreneurship was an opportunity to climb up the social strata. Therefore, Li (1998: 93) argues that Chinese entrepreneurship represents a combination of 'elite circulation' and 'elite formation'. Based on a survey conducted in 2000, Chinese entrepreneurs were more professionalised, younger, and educated than before (Chinese Entrepreneur System, 2000). As further revealed by the CHARLS data, employee entrepreneurs comprise a substantial portion of Chinese entrepreneurs.

Farmer entrepreneurs

Farmer entrepreneurs refer to those who had mainly engaged in farming activities before starting their own businesses. The farming activities can either be as employed farmers labouring on other people's land for money or ploughing their own land for crops. As a result of urbanisation, the most populous self-employed sector since the late 1980s was actually the fastest-growing off-farm sector in rural China. From 1988 to 1995, up to 30 million self-employed workers emerged in rural China, which consisted of almost 40% of all new off-farm jobs (Rozelle et al, 1999). One impact of the previous Reform and Open Up is the surplus labour force in rural China, who had no other choice but to flee to urban areas for better employment opportunities (Fang et al, 2018). In rural areas, the demographic combination had already shifted from a high birth rate coupled with a high mortality rate to one of a high birth rate coupled with a low mortality rate. The result was a dual economy characterised by a labour surplus in agriculture, starting the process of economic involution (Lewis, 1954). More specifically, large numbers of labourers from the countryside moved to urban areas and engaged in labour-intensive industries, which delayed diminishing returns to capital until the 2000s. These low-skilled rural labourers' contribution to urban development was not fairly rewarded with social integration due to the rather strict household registration system (*hukou*) in urban sites. The Chinese *hukou* system is a means of population registration, which can either be urban or rural for an individual. A person's *hukou* is attached to a city or local municipality and determines where they can access social services like hospitals and schools. It is possible, though difficult, to convert one's *hukou* status from rural to urban with some extra effort. Possible measures include pursuing higher education, becoming a civil servant and so on. As a way to circumvent the otherwise stiff social and economic stratification in urban areas, some migrant workers chose self-employment for higher economic return and hopefully better social return (Zhou et al, 2020).

In addition to the rural-to-urban migrants, return migrants who later started their businesses back home also constitute a growing trend in China. Stemming from the winner/loser dichotomy, Murphy's (1999) fieldwork in Jiangxi revealed returnees' role as agents to transfer information between rural and urban sites, entrepreneurship,

and economic diversification in rural communities. Similar to Murphy's findings, Zhao (2002) also concluded that return migrants helped to modernise rural villages through investment. Though national-level empirical studies are still lacking, some researchers did report anecdotal findings of the positive contribution from returnees, such as the technical skills and entrepreneurial experience (Cai, 2000; Qiu, 2001; Qiu et al, 2004). In this way, both the previous migrant workers and return migrants are possible sources of farmer entrepreneurs in our study.

Necessity entrepreneurs

Few pieces of literature have looked explicitly at necessity entrepreneurs in China, who point to those people who had already been out of the workforce for a substantial amount of time and then came back to be self-employed. Different from the entrepreneurs who were either laid off or unskilled, necessity entrepreneurs could be well-educated and could have engaged in professional jobs before leaving the job market. The reason to leave the job market varies, including but not limited to pregnancy, return to education, military service and caring for family members. However, after having been out of the workforce for a substantial amount of time, this group of people, especially those who left for family or health issues, were similarly marginalised as unskilled workers. For example, the motherhood penalty, referring to mothers' disadvantaged positions in terms of employment relative to childless women, contributes to one important portion of necessity entrepreneurs. Focusing on the general workforce in the US, Budig (2006) empirically proved that compared to professional self-employed women, self-employed women engaging in non-professional sectors found the motherhood penalty to be harsher and thus faced more obstacles in returning to the workforce. Unfortunately, possibly due to data limitation, little Chinese research has specifically focused on the necessity entrepreneurs in China, whose number might be increasing dramatically today, given the popularity of e-commerce.

Taken together, though, without accurate data, we can see several major components comprising the entrepreneurial population in China, including cadres and managerial staff from previous collective enterprises, laid-off workers from collective enterprises, 'set-down youths' returning back to cities, the surplus labour in rural China, and perhaps those who temporarily left the workforce for family issues and then could not find suitable jobs in the market. Similarly to previous research, the rise of Chinese entrepreneurs is also closely related to economic reform in the bigger context.

Life outcomes of the entrepreneurial trajectories

Other than the bigger socio-economic context, another reason why certain people chose entrepreneurship and could engage in their career persistently is their overall positive experience and bearable negative experience throughout the self-employment period, that is, the life outcomes of entrepreneurship. Two competing theories have specifically looked at this issue, which are the cumulative disadvantage theory and the set-point theory (Dannefer, 2003; Georgellis and Yusuf, 2016). The former argues that one's life outcome is a cumulative process, while the latter denotes the transient nature of life outcomes.

From this perspective, since one's life outcome is a cumulative process, positive experiences throughout one's life course may result in further advantages at older ages. Similarly, negative experiences may also result in further disadvantages. In other words, (dis)advantages tend to cluster longitudinally, and inequalities would grow throughout the course of life (Dannefer, 2003). Seconding the cumulative advantage theory, self-employed individuals can be better at coping with adversities in life compared to employees. Collecting retrospective data on European adults aged between 50 and 70 years old (the Survey of Health, Ageing and Retirement in Europe – SHARE), scholars showed that early adversity is linked to full-time employment ending in early retirement and to discontinuous working histories (in the case of women), but not to histories of self-employment. To explain the differences, scholars argued that early adversity could be correlated to harsher situations, which was more likely to be the case for employees than for self-employed people. This implies that self-employment is a more tolerable career choice.

In addition to the early adversity, different intensity in entrepreneurship engagement is closely related to entrepreneurial outcomes. For example, authors generated four self-employment clusters using the German Household Panel data, which covered individuals' employment experience over a 26-year span. The four common clusters are mixed self-employment, intermittent self-employment, necessity self-employment and persistent self-employment. Among the four clusters, the persistent self-employment careers have the highest gross labour income and exhibit higher job and life satisfaction (Koch et al, 2021).

In China, as previously explained, a certain portion of Chinese entrepreneurs was engaging in farming activities previously. Farming life was generally sustainable and stable until the 1980s, after which farming activities were increasingly professionalised with technological advancement. In this way, many rural labourers were freed from laborious work. At the same time, the Reform and Open Up accelerated the urbanisation process in China, which attracted many rural dwellers to the idea of migration to urban areas for higher economic returns. Even if entrepreneurship had helped them with the strict household registration system in urban China, which structurally prohibits their social and economic integration into the local society in the destination, their early adversity in laborious farming work might yield long-lasting health consequences. In addition to the farming activities per se, their previous disadvantaged positions may be correlated to a lifetime of disadvantages, such as being excluded from the social welfare system in urban areas. Therefore, following the cumulative (dis)advantage theory, we hypothesise that:

> Hypothesis 1: Chinese entrepreneurs who engaged in farming activities at an early stage have worse self-rated health and economic return than other Chinese entrepreneurs.

Similarly, following the cumulative advantage theory, Chinese entrepreneurs who initially engaged in collective enterprises were better positioned to start their businesses. For example, they relied on the social capital gathered when they were cadres or managerial staff, or obtaining professional skills from education, which could directly translate into monetary return in entrepreneurship (Li, 1995). In this way, we hypothesise that:

> Hypothesis 2: Among all Chinese entrepreneurs, employee entrepreneurs have the best health and economic outcomes.

A competing hypothesis of the cumulative advantage theory is the set-point theory, which argues that the increased job satisfaction associated with the transition into self-employment can be temporary in nature (Georgellis and Yusuf, 2016). First, a transition into self-employment, which is normally considered a positive life and economic event, has the potential to boost employees' job satisfaction. However, when the novelty of the new ventures wanes and the self-employed become accustomed to their new status, job satisfaction with one's self-employment would quickly adjust to its original level. In this way, embedding self-employment experience in one's whole work history becomes even more important to fully understand its comprehensive health consequences. While scholars have empirically tested that shifting from being employed to self-employment might be negatively associated with one's mental state due to the increased work-related stress, it is possible that entrepreneurs can gradually adjust to the mental strain along with the business growth and self-adaptation (Kivimäki et al, 2006; Andersson, 2008). In this way, we hypothesise that:

> Hypothesis 3: In the long run, entrepreneurs from different trajectories do not significantly differ from one another in depressive symptoms.

In sum, we can see an increasing diversity of Chinese entrepreneurs, who now urgently need a more rigorous study to understand their heterogeneity and life outcomes. Sociological research on entrepreneurship in China has predominantly focused on the societal-level development of Chinese entrepreneurship (Li and Matlay, 2006). Few sociological studies have looked at individual pathways towards entrepreneurship, and virtually none have explored the life outcomes of individual entrepreneurs. Therefore, our research is on the avant-garde life trajectories of Chinese entrepreneurs and their life outcomes. The next section addresses the data and methods used to identify Chinese entrepreneurs' typology and life outcomes.

Data and method

Data

To obtain comprehensively measured employment history of Chinese adults in this research, we used two waves of data (2014 and 2015) from CHARLS. CHARLS is a nationally representative survey of individuals aged over 45 in China. The survey aimed to better understand the socio-economic determinants and consequences of ageing among old Chinese adults. The survey includes rich information on economic standing, physical and psychological health, demographics, and the social networks of aged persons. CHARLS is supported by Peking University, the National Natural Science Foundation of China, the Behavioral and Social Research Division of the National Institute on Aging, and the World Bank. The survey is up to international standards as it shares the same basic guidelines as the Health and Retirement Study (HRS) and related ageing surveys such as the Korean Longitudinal Study of Aging (KLoSA) in the Republic of Korea. Please refer to the CHARLS Handbook for more information.[2]

The baseline wave of CHARLS was carried out from 2011 to 2012, and the participants were followed up every two years. The baseline wave contains 17,708 cases in total. In addition to the regularly gathered longitudinal data, to obtain a more comprehensive understanding of the overall life history of Chinese elders, the research team carried out a specific wave of life history data collection in 2014. The sample includes all respondents in the first two waves (2011 and 2013) of the longitudinal sample who were still alive at the time of the interview. It covers seven life history modules: residence, demographics, family, education, health and healthcare, wealth, and employment. This sample nicely captured a large number of individuals born in or before 1975 and experienced the social change brought about by the Reform and Open Up in China. In total, 20,543 individuals participated in the life history wave, among whom 18,723 were successfully traced in the 2015 wave. Therefore, the attrition rate between the two waves included in the sample was 8.86%. We adopted INDV_weight_ad2 throughout the analysis to account for the attrition problem. INDV_weight_ad2 was the individual weight with household and individual response adjustment provided by the data set.

This research incorporates a comprehensive entrepreneurial pool, including those who had stayed as entrepreneurs persistently and those who shifted from farming to entrepreneurial activities. Since people can open a business in either rural or urban areas, we have included both rural dwellers and urbanites in our sample. Focusing on the internal heterogeneity of Chinese entrepreneurs, we have only kept those individuals whose last economic activity is self-employment. Admittedly, our criteria might result in a highly selective sample in which the entrepreneurs self-selected themselves into entrepreneurship. In other words, they might be inherently quite different from other types of temporary entrepreneurs, that is, those who engaged in entrepreneurship for some time and left for other career opportunities. In addition, due to data limitation, individuals who were self-employed but not when last observed are lost to the analysis despite the possibility that they may reasonably be regarded as contributing to self-employment in China. Acknowledging these disadvantages, we need to interpret the results from the regression analysis with reservations to infer the situation of the general population. There are other limitations with our life history data as well. First, the data does not differentiate between self-employment with employees and solo self-employment, who might have different health outcomes. Second, the data has only covered older entrepreneurs, leaving the more recently arising entrepreneurs – for example, college students who start their own businesses – underexplored. Third, the data only provided limited measures for the life outcomes of Chinese entrepreneurs. More objective measures, such as clinical reports, and subjective measures, such as conventional life satisfaction, are also important for the health outcome. For the economic outcome, more financial indicators, such as debt and cashflow, can also better depict entrepreneurs' financial picture. Additionally, while life history data can theoretically provide a complete work history, it may suffer from inaccurate recall and lack of subjective measures at certain points of time in the past.

Relying on the employment history module in the life history data, we coded each individual's complete work trajectory and linked it to the life outcomes in the 2015 wave. Capitalising on the retrospectively collected life history information, our sequences are generally complete, which is quite rare in life history analysis.[3] At the same time, we do acknowledge that retrospective data may suffer from an inaccurate recount or memory beautification, which is one limitation of this study.

Dependent variables

Self-rated health

Self-rated health measures one aspect of health outcomes. It is a discrete variable taking on five possible values ranging from 1 to 5, with a higher value representing better health. To increase the validity of the measurement, each participant has two slightly different measures for self-rated health, both of which are included in our study. The first measure is: 1 'Poor', 2 'Fair', 3 'Good', 4 'Very good', and 5 'Excellent'. The second measure is 1 'Very poor', 2 'Poor', 3 'Fair', 4 'Good', and 5 'Very good'.

Depression

Depression is measured by the standard ten-item CES-D questionnaire. It is a self-reported questionnaire consisting of ten questions about various depression symptoms in the past week. Please refer to Table A1 in the Appendix for the complete list of questions. The total CES-D score ranges from 0 to 30, with a higher score indicating more depressed symptoms in the past week. Each question takes on four possible values, which are 0: 'Rarely or none of the time (<1 day)', 1: 'Some or little of the time (1–2 days), 2: 'Occasionally or a moderate amount of the time (3–4 days)' and 3: 'Most or all of the time (5–7 days)'.

Income

We use individuals' income to measure their economic outcomes. Since we only focus on the self-employed portion of the total population, we specifically used respondents' after-tax net income earned from self-employed activity in the last year. It is the earned income minus the cost of energy, housing or equipment rental, raw materials, transportation, marketing, wages, taxes and other fees.

Independent variables

Control variables

Previous research showed that changes in housing, marital and family status are common life decisions that may influence one's career decisions, which need to be controlled for (Pollock, 2007). Thus, throughout the models, we have controlled for a set of demographic and socio-economic variables. Demographic variables include gender, age, age squared and marital status. Socio-economic variables include self-employment percentage, years of education received, entry cohort for entrepreneurship, childhood predictors, place of residence and current *hukou* status.

Demographic variables

Gender is a binary variable, with 1 referring to a male and 0 referring to a female. Age is a continuous variable ranging between 45 and 65. We have included the squared age in the model to capture the potential curvilinear relation between age and life outcomes. Marital status is a binary variable with 1 for married and 0 for others.

Socio-economic variables

The self-employment percentage takes on a value between 0 and 1. We obtained this number by dividing the total number of years engaging in self-employment by the total number of years in the workforce. Therefore, a larger percentage implies spending a greater proportion of work-years in self-employment.

Years of education received is a discrete variable ranging from 0 to 21. It is recoded from educational attainment, in which 0 equals illiterate while 21 equals having completed at least a university-level degree.

In case the time point of entering entrepreneurship is an influential factor, we controlled for one's first time of picking up non-agricultural self-employment. We constructed five entry cohorts in total, which are 1964–78, 1979–89, 1990–99, 2000–09 and 2010–14. The first entry cohort covers the period before the Reform and Open Up. The second to the fourth entry cohorts cover every ten years after the Reform and Open Up. The last entry cohort includes all participants who first entered entrepreneurship in or after 2010. One's employment trajectory and life outcomes are often closely related to one's family background. A vast literature has empirically proved that childhood experience is closely related to adults' labour-market performance and adult health (Gregg and Machin, 2001; Duncan et al, 2010).

Family background may also shape individuals' entrepreneurial propensity through daily interaction and cultural influence (Carroll and Mosakowski, 1987). Therefore, in this research, we have controlled for. a set of childhood predictors, including first *hukou* status, father's educational background, mother's educational background, number of siblings, childhood family financial condition, and whether having experienced famine in childhood. First *hukou* status is a binary variable, with 1 representing non-agricultural *hukou* and 0 representing agricultural *hukou*. It partially captures respondents' residential environment in childhood. Father's and mother's educational backgrounds are important indicators for participants' childhood socio-economic status. Both variables are translated into years of education received and range from 0 to 17, with higher value indicating more years of educational attainment. Family's financial condition in childhood in comparison to others is a discrete variable taking on five possible values, which are 1: 'A lot worse', 2: 'Somewhat worse', 3: 'Same', 4: 'Somewhat better' and 5: 'A lot better'. Whether having experienced famine is a dummy variable, with 1 indicating 'yes' and 0 indicating 'no'.

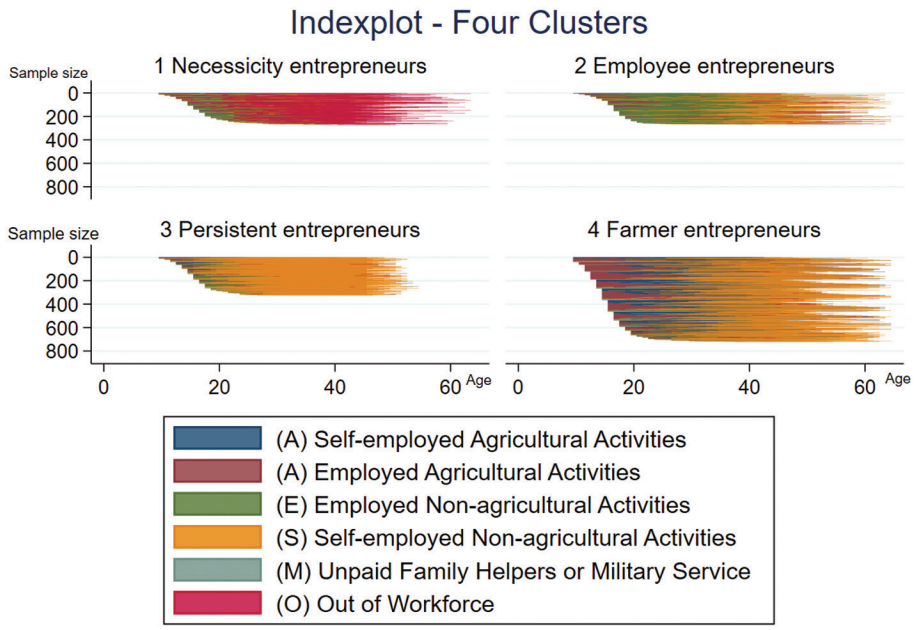
Place of residence is a binary variable, with 1 representing urban areas and 0 representing rural areas. Similar to first *hukou* status, current *hukou* status is also a binary variable with 1 for non-agricultural *hukou* and 0 for agricultural *hukou*. Additionally, we have also controlled for logged self-employment income when the outcome variables are health outcomes.

Method

Cluster indicator

Using the optimal matching (OM) technique, we generated four cluster indicators, each of which represents a unique type of career trajectory towards entrepreneurship. In other words, based on distance calculation, those entrepreneurs with similar career transitions are grouped into one cluster. As shown in Figure 1, we relied on six working states to calculate the distance: (1) self-employed agricultural activities,

Figure 1: Index plot for four typical entrepreneurial trajectories in China



(2) employed agricultural activities, (3) employed non-agricultural activities, (4) self-employed non-agricultural activities, (5) unpaid family helpers or military service and (6) out of the workforce. Since we are only interested in those who eventually became entrepreneurs, we have only included the participants whose very last economic activity was non-agricultural self-employment. In this way, those who briefly engaged in entrepreneurship but then shifted to other economic activities in the end are not in our sample.

Sequence analysis

We employed sequence analysis to exploit the different trajectories towards entrepreneurship in this research. Due to its ability to visualise and preserve complex information throughout a long period, sequence analysis has gained increasing popularity in life history studies in recent years. Sequence researchers often generate typologies as a method for analysing sequences (Aisenbrey and Fasang, 2010). Here we adopted the cluster analytic procedure described in Brzinsky-Fay et al's (2006) research to identify the recurrent patterns of employment histories. Individual sequences may differ from one another in various small ways, for example, the total number of states, the length of each spell, the total length of the sequence, and the entropy representing the transition between states (Liao and Gan, 2020). The construction of a sequence typology, on the other hand, is to ignore these small differences to identify typical trajectory types that are homogenous enough within each type but different enough across the types. Such a process is often termed 'optimal matching' (OM) or the Needleman–Wunsch approach, which is also the sequence distance calculation adopted in this study (Abbott and Hrycak, 1990). With cluster analysis, we can find the recurrent patterns of the so-called 'ideal-typical sequences' or medoids (Abbott

and Hrycak, 1990). Please refer to Benjamin Cornwell's book *Social Sequence Analysis: Methods and Applications* for a more detailed review of the sequence analysis method (Cornwell, 2015).

For the sequence analysis, we followed two steps to identify the similarities and differences between sequences. First, to find out the distance, that is, the quantified differences between two sequences, we calculated the distance matrices between all pairs of sequences using the oma command in Stata. The oma command calculates inter-sequence distances using the Needleman–Wunsch approach. We chose the Needleman–Wunsch algorithm as it is the most commonly used and widely implemented algorithm in social sequence analysis (Cornwell, 2015). OM, or the Needleman–Wunsch algorithm, works with sequences that pass through a finite, discrete state space, such as strings of bytes representing characters. This explains why OM was first used in molecular biology, where DNA sequences are linear macro-molecules with repeating elements drawn from a small set (Blanchard et al, 2014). OM's elementary operations of insertion, deletion and substitution implicitly require sequences to consist of discrete, successive tokens, which can be operated on as independent atomic units. While the life course is a continuous concept, we coded each year as one element. Then spells are represented by runs of consecutive tokens, representing duration as repetition. Most statistical software in the market, such as Stata and R, adopted the Needleman–Wunsch approach, which makes it quite easy to implement. In addition, a whole series of established studies relied on OM to analyse labour-market states (McVicar and Anyadike-Danes, 2002; Anyadike-Danes and McVicar, 2005; Albert Verdú and Davia, 2010; Andresen and Biemann, 2013), which further increases the validity of this approach.

The inter-sequence distance is only one of the two requirements to generate clusters; the other is the substitution cost matrix, that is, the matrix used to define the similarity and dissimilarity between the states of the state space. In our research, there are six possible states, which are (1) self-employed or employed agricultural activities (A), (2) employed agricultural activities (A), (3) employed non-agricultural activities (E), (4) self-employed non-agricultural activities (S), (5) unpaid family helpers or military service (M), and (6) out of the workforce (O). In this research, our interest is limited to those whose last economic activity at the time of the interview or before retirement / being out of the workforce is self-employed non-agricultural activity. Then, we need to determine the level of (dis)similarity between the different states. Some researchers would use theory or prior information to manually define these transition values, such as McVicar and Anyadike-Danes's (2002) study on predicting school-leavers' (un)successful transition to the job market. However, in the case of state transition in China, we do not have any previous theories to rely on to form a reasonable transition matrix. To find out the best-fit substitution matrix between states, we did not arbitrarily assign a substation matrix but relied on the data-driven substitution matrix with the trans2subs command. The trans2subs command creates a matrix of the transition-rate-based distances. Within the trans2subs, the substitution cost does not vary overtime. This is more suitable for our research question as we are only interested in individuals whose last-ever job is non-agricultural self-employment. As a side note, certain methods to calculate the data-driven substitution matrix allows for time-varying transition rates, such as calculating Lesnard's dynamic Hamming distances between sequences in the data (the corresponding Stata code is dynhamming).

Very often, sequence analysis proceeds by conducting cluster analysis on the pairwise distance matrix, and so does our research. In our results section, we will present the generated clusters, each of which depicts a group of Chinese entrepreneurs sharing similar career paths.

Ordinary least square analysis

Using the ordinary least square method, we explored the association between distinct clusters and their respective life outcomes, including health outcomes and economic outcomes. Health outcomes are measured by the aforementioned self-rated health and depression, which are the only available outcome variables in the data set. CHARLS did not collect life satisfaction or job satisfaction, which might be more directly related to health outcomes, until the more recent 2018 wave. However, to preserve a larger sample size still engaging in work, we relied on the outcome variables in the 2015 wave. On the other hand, economic outcomes are measured by the individual income from self-employment. The equation captures the association we want to test empirically:

$$LifeOutcome_i = \mu_1 + \beta_1 EntrepTraj_i + \gamma_1 Var_i + \alpha_1 Cohort_i + \varepsilon_i$$

$LifeOutcome_i$ is the outcome variable of individual i. $EntrepTraj_i$ is entrepreneur i's entrepreneurial trajectory. Var_i is a whole set of key independent variables and control variables. $Cohort_i$ is the entry cohort fixed effect to compare those who had picked up entrepreneurship in the same period. To correct for potential heteroskedasticity, we applied robust standard errors (ε_i) throughout the analysis.

Results

We follow three steps to present the story here. First, we will show the generated clusters based on the oma calculation and postulate each cluster's demographic background and life outcomes. Then, we will compare the generated clusters to better present the demographic composition of each entrepreneurial trajectory. Ultimately, we will show whether these distinct trajectories correspond to different life outcomes.

The four trajectories towards self-employment in China

Based on similar patterns in sequences of events, sequence analysis identified four distinct clusters of entrepreneurs in China. Each cluster represents a specific type of employment trajectory before picking up entrepreneurship. The yellow colour in Figure 1 represents the work-years engaging in self-employment. The *x*-axis represents participants' age throughout their work history. The *y*-axis shows the number of participants within each cluster. For example, cluster 2 shows that those who first worked as employees and then became entrepreneurs consistent of more than two-hundred participants. In fact, the exact number of this type of entrepreneur was 231.

Figure 1 shows four entrepreneurial clusters (1) *necessity entrepreneurs* – represented by those with long periods of being out of the workforce before entrepreneurship, as shown by the red component in cluster 1; (2) *employee entrepreneurs* – represented by those who were mainly employed by in non-farming industries before entering the entrepreneurial world, as showed by the green component in cluster 2; (3) *persistent entrepreneurs* – represented by those who picked up entrepreneurship soon

after entering the workforce and had stayed being self-employed for the rest of their work history, as showed by the long yellow component in cluster 3; and (4) *farmer entrepreneurs* – represented by those who mainly engaged in farming activities at the beginning, as shown by the blue and maroon components in cluster 4. The possible career trajectories of these four types of entrepreneurs are explained in the earlier section 'Typology: different entrepreneurial trajectories'. A glance at Figure 1 already reveals a rather small portion of employee entrepreneurs among the four clusters, as shown by the shorter height of cluster 2.

Taken together, the decision to generate four clusters has both theoretical and technical bases. Theoretically, as will be further explored, four clusters nicely capture China's four distinct entrepreneurial trajectories since the 1970s. Technically, to ensure a four-cluster solution is the most suitable, we relied on two statistics to select the number of clusters, the Calinski and Harabasz pseudo-F and the Dunda-Hart pseudo-T^2 (Garip, 2012). We used the Stata command clustermat to calculate the average-linkage cluster analysis on our observations (StataCorp, 2007). Table 1 displays the index results ranging from one or two to ten clusters. The index from Calinski and Harabasz pseudo-F shows that either three (pseudo-F = 278.49) or four clusters (pseudo-F = 192.14) would yield the best results – we look for the largest numbers for the Calinski and Harabasz pseudo-F index. The Duda–Hart pseudo-T^2 index shows that a four-cluster solution is the best (Duda–Hart pseudo-T^2 = 2.86) – we look for the smallest number for this index. Since both indexes point out that four clusters can better capture the similarities and differences in the observations, coupled with our theoretical observation, we decided to divide the sample into four clusters.

The vertical axis in Figure 1 represents the number of cases in the analytical sample, and the horizontal axis represents individuals' working histories. The horizontal axis ranges from 10 to 65, meaning that the earliest age for one to enter the workforce is 10 and the eldest person in our data set so far was 65 in 2015. Straightforwardly, we can already compare the size of the four clusters in Figure 1. From cluster 1 to cluster 4, Figure 1 shows the four typical entrepreneurial paths, which are: 1 – necessity entrepreneurs (exemplified by the predominantly 'out of workforce' experience before entrepreneurship); 2 – employee entrepreneurs (exemplified by the predominantly non-agricultural employment activities in their sequences); 3 – persistent entrepreneurs (exemplified by the larger portion of non-agricultural self-employment activities in their sequences); and 4 – farmer entrepreneurs (exemplified by the predominantly agricultural activities in their sequences).

Combining the information in Figure 1 and Table 2, we can tell that farmer entrepreneurs compose the largest group, contributing to 720 cases or 45.48% of the analytical sample. The second largest is persistent entrepreneurs, contributing to 323 cases or 20.40% of our analytical sample. Following the persistent entrepreneurs are necessity entrepreneurs, which include 273 cases and contribute to 17.25% of the sample. The smallest group is employee entrepreneurs, which includes only 267 cases and contribute to 16.87% of the sample.

Cluster comparison

Cluster comparison picks the generated clusters and compares one with the others. Here, we specifically compare necessity entrepreneurs to the other three types of entrepreneurs to prove the former as a more special group of people. As displayed

Table 1: Cluster validation measures across number of clusters

No. of clusters	Calinski and Harabasz pseudo-*F*	Duda–Hart	
		Je(2)/Je(1)	pseudo-T^2
1		0.9134	149.67
2	149.67	0.7998	374.97
3	278.49	0.8413	14.91
4	192.14	0.9978	2.86
5	144.98	0.9923	9.98
6	118.62	0.9874	16.21
7	102.46	0.9823	22.63
8	92.18	0.9862	17.44
9	83.63	0.6526	3.73
10	74.91	0.9984	1.95

in Figure 1, most necessity entrepreneurs were in the workforce only for a very short period of time. This might imply that the measured outcome variables at the time of the survey might not have captured the entrepreneurial outcome of these individuals well. Therefore, in the later analysis, we only focused on the other three entrepreneurial paths as they are more comparable to each other. Since necessity entrepreneurs are quite a diverse group of people who might only share very limited similarities, here we only present the brief demographic information of this group of people.

As shown in Table 3, among the 273 necessity entrepreneurs, 157 (57.51%) are females and 116 (42.49%) are males. In comparison, the percentage of female and male entrepreneurs in the other three clusters are 37.02% and 62.98%, respectively. Therefore, it is true that females are more likely than males to become necessity entrepreneurs. Necessity entrepreneurs are aged between 33 and 65, with the mean age being 50.40. Entrepreneurs of the other three types (the focus of this study) are aged between 41 and 65, with the mean age being 53.07, which is higher than that of the necessity entrepreneurs. The mean age of the other three types of entrepreneurs breaks down thus: persistent entrepreneurs (48.20) < employee entrepreneurs (53.11) < farmer entrepreneurs (55.23). Such an age difference between different types of entrepreneurs is explainable using the social mobility model, in which entrepreneurs are often considered as occupying a relatively higher social stratum (Niu et al, 2021) – much higher than that of the employees or farmers. Then, shifting from being an employee or a farmer to being an entrepreneur would imply a rise in one's social status. Since the distance between farmers and entrepreneurs is the largest in terms of social status, we would naturally expect farmers to spend more years reaching entrepreneurship. Therefore, farmer entrepreneurs are the oldest among the three types.

Similar to other entrepreneurs, more than 95% of the necessity entrepreneurs in our sample are married, and their mean years of education received is 6.40. Some 70.04% of necessity entrepreneurs live in urban areas, and 44.21% of them hold non-agricultural *hukou*, which are all significantly higher than those of the other three types. Taken together, necessity entrepreneurs are likely to be females living in urban areas. They engaged in entrepreneurship briefly, quickly moved out of the workforce and possibly became housewives.

Table 2: Summary statistics of selected variables

	Full sample	(1) Necessity entrepreneurs (n %)	(2) Employee entrepreneurs (n %)	(3) Persistent entrepreneurs (n %)	(4) Farmer entrepreneurs (n %)
	1,583	273 (17.25%)	267 (16.87%)	323 (20.40%)	720 (45.48%)
Dependent variables					
Self-rated health 1	2.41 (1.00)	2.46 (1.03)	2.47 (0.97)	2.59 (1.11)	2.30 (0.94)
Self-rated health 2	3.33 (1.00)	3.33 (1.05)	3.32 (0.97)	3.46 (1.06)	3.27 (0.97)
CES-D score	6.51 (5.80)	6.43 (5.72)	6.00 (5.22)	5.59 (5.20)	7.10 (6.20)
No. of doctor visits	0.37 (1.26)	0.50 (1.78)	0.29 (0.79)	0.36 (1.30)	0.36 (1.15)
Self-employed income after tax (logged)	2.18 (4.17)	2.98 (4.66)	2.33 (4.26)	2.57 (4.55)	1.66 (3.68)
Self-employed income after tax	9,551.71 (39,762.48)	13,077.22 (41,540.3)	9,750.90 (39,361.42)	18,989.3 (68,433.93)	4,161.52 (12,643)
Independent variables					
Years being self-employed (Mean/SD)	15.99 (10.90)	4.87 (5.71)	10.67 (6.15)	26.32 (5.43)	17.54 (10.68)
% of being self-employed	47.72%	32.49%	30.39%	81.90%	44.58%
Years of education received (Mean/SD)	6.37 (2.89)	6.40 (2.60)	7.52 (2.96)	6.42 (2.26)	5.91 (3.11)
Entry cohort of entrepreneurship (n/%)					
1.1964–78	60 (3.79%)	5 (1.83%)	2 (0.75%)	9 (2.79%)	44 (6.13%)
2.1979–89	473 (29.88%)	69 (25.27%)	32 (11.99%)	162 (50.15%)	210 (29.25%)
3.1990–99	518 (32.72%)	104 (38.10%)	72 (26.97%)	147 (45.51%)	195 (27.16%)
4.2000–09	403 (25.46%)	77 (28.21%)	134 (50.19%)	5 (1.55%)	187 (26.04%)
5.2010–14	129 (8.15%)	18 (6.59%)	27 (10.11%)	0 (0.00%)	82 (11.42%)
Childhood predictors					
First *hukou* type (n/%)					
Agricultural *hukou*	1,379 (87.11%)	228 (83.52%)	182 (68.16%)	284 (87.93%)	685 (95.14%)
Non-agricultural *hukou*	204 (12.89%)	45 (16.48%)	85 (31.84%)	39 (12.07)	35 (4.86%)
Father's years of education received (Mean/SD)	3.44 (3.53)	4.41 (3.74)	3.69 (3.60)	3.87 (3.68)	2.79 (3.23)
Mother's years of education received (Mean/SD)	1.43 (2.71)	2.09 (3.12)	1.73 (2.82)	1.93 (3.08)	0.85 (2.16)

(*Continued*)

Table 2: Continued

	Full sample	(1) Necessity entrepreneurs (n %)	(2) Employee entrepreneurs (n %)	(3) Persistent entrepreneurs (n %)	(4) Farmer entrepreneurs (n %)
No. of siblings (Mean/SD)	3.87 (1.69)	3.73 (1.51)	3.89 (1.59)	3.65 (1.69)	4.02 (1.76)
Childhood family financial condition (Mean/SD)					
1.A lot worse	312 (19.83%)	48 (17.71%)	41 (15.41%)	50 (15.67%)	173 (24.13%)
2.Somewhat worse	246 (15.64%)	36 (13.28%)	47 (17.67%)	59 (18.50%)	104 (14.50%)
3.Same	808 (51.37%)	142 (52.40%)	127 (47.74%)	165 (51.72%)	374 (52.16%)
4.Somewhat better	183 (11.63%)	42 (15.50%)	41 (15.41%)	40 (12.54%)	60 (8.37%)
5.A lot better	24 (1.53%)	3 (1.11%)	10 (3.76%)	5 (1.57%)	6 (0.84%)
Whether have experienced famine in childhood (n/%)					
1.Yes	1,144 (72.27%)	193 (70.70%)	193 (72.28%)	206 (63.78%)	552 (76.67%)
2.No	439 (27.73%)	80 (29.30%)	74 (27.72%)	117 (36.32%)	168 (23.33)
Control variables					
Gender					
Male	941 (59.44%)	116 (42.49%)	181 (67.79%)	222 (68.73%)	422 (58.61%)
Female	642 (40.56%)	157 (57.51%)	86 (32.21%)	101 (31.27%)	298 (41.39%)
Age in 2015 (Mean/SD)	52.61 (6.13)	50.40 (5.89)	53.11 (6.01)	48.20 (3.07)	55.23 (5.88)
Marital status (n/%)					
Married	1,372 (95.34%)	235 (95.14%)	235 (96.31%)	274 (96.14%)	628 (94.72%)
Others	67 (4.66%)	12 (4.86%)	9 (3.69%)	11 (3.86%)	35 (5.28%)
Current *hukou* status (n/%)					
Agricultural	974 (70.53%)	130 (55.79%)	104 (43.88%)	191 (70.22%)	549 (85.92%)
Non-agricultural	407 (29.47%)	103 (44.21%)	133 (56.12%)	81 (29.78%)	90 (14.08%)
Residence (n/%)					
Urban areas	823 (57.19%)	173 (70.04%)	179 (73.36%)	186 (65.26%)	285 (42.99%)
Rural areas	616 (42.81%)	74 (29.96%)	65 (26.64%)	99 (34.74%)	378 (57.01%)

Table 3: Necessity entrepreneurs versus others

	Necessity entrepreneurs	The other three clusters
Gender (n/%)		
Male	116 (42.49%)	825 (62.98%)
Female	157 (57.51%)	485 (37.02%)
Age (Mean/SD)	50.40 (5.89)	53.07 (6.09)
Years of education received (Mean/SD)	6.40 (2.60)	6.36 (2.95)
Marital status (n/%)		
Married	235 (95.14%)	1,137 (95.39%)
Others	12 (4.86%)	55 (4.61%)
Residence (n/%)		
Urban areas	173 (70.04%)	650 (45.57%)
Rural areas	74 (29.96%)	542 (45.47%)
Current *hukou* status (n/%)		
Non-agricultural	103 (44.21%)	304 (26.48%)
Agricultural	130 (55.79%)	844 (73.52%)

To better understand the differences across the other three entrepreneurial paths, we conducted a cluster comparison to delineate the characteristics. Table 4 presents the three-cluster comparisons to better delineate the characteristics of each entrepreneurial path. We will interpret the results by key independent variables. In terms of age, persistent entrepreneurs are significantly older than employee entrepreneurs and significantly younger than farmer entrepreneurs. At the same time, we did not observe any significant age differences between farmer entrepreneurs and employee entrepreneurs. Among all three, employee entrepreneurs seem to be the most well-off financially. They are significantly richer than both farmer entrepreneurs and persistent entrepreneurs, while the latter two are not significantly different from one another financially. As shown by the percentage of work-years as self-employed, persistent entrepreneurs have the largest percentage while the other two are not much different from one another. As for gender composition, compared to farmer entrepreneurs, employee entrepreneurs are significantly more likely to be males. This is explicable, as more than 90% of employee entrepreneurs were previous cadres or managerial staff in either state-controlled firms or collective-controlled enterprises, both of which were more likely to be male-dominated. CHARLS also enquired whether the person was on official staff when being employed. Though most participants did not answer this question, among those who did answer, we could tell that most were official staff with rather secure positions. Unfortunately, we could not tell whether they were managers or workers. Employee entrepreneurs had the highest probability of having urban *hukou*, while farmer entrepreneurs had the lowest probability of urban *hukou*. Both persistent entrepreneurs and employee entrepreneurs are more likely to live in urban areas than farmer entrepreneurs, while persistent entrepreneurs are even more likely to live in urban areas than employee entrepreneurs. This is quite easy to understand, as persistent entrepreneurs might be migrant workers who stay in urban areas for small businesses and farmer entrepreneurs are those staying in rural sites and running their own businesses. At the same time, there might have been a certain number of previous rural cadres who then started to run their own businesses. On average, employee entrepreneurs are the most educated group. In order to be

Table 4: Cluster analysis

	(4.1)	(4.2)	(4.3)
	Persistent entrepreneurs (1) vs Employee entrepreneurs (0)	**Persistent entrepreneurs (1) vs Farmer entrepreneurs (0)**	**Employee entrepreneurs (1) vs Farmer entrepreneurs (0)**
Age	0.365** (2.55)	−0.329** (−2.28)	0.088 (0.93)
Income from self-employment (logged)	−0.258** (−2.25)	−0.027 (−0.57)	0.093*** (2.63)
% of being self-employed	42.305*** (4.71)	18.036*** (6.79)	−5.657*** (−6.23)
Male *(ref: female)*	0.584 (0.56)	1.679*** (2.92)	0.977*** (3.38)
Hukou (ref: agricultural hukou)			
Non-agricultural *hukou*	−0.128 (−0.12)	0.993 (1.37)	2.200*** (5.57)
Urban residence *(ref: rural residence)*	3.010*** (2.94)	0.728** (1.95)	2.125*** (4.46)
Years of education received	−0.227 (−1.32)	0.164 (1.59)	0.138*** (3.09)
Marital status *(ref: others)*			
Married	−4.938*** (−2.89)	−0.054 (−0.03)	0.518 (1.01)
Childhood predictors			
First *hukou* status *(ref: agricultural)*			
Non-agricultural	−1.560 (−1.13)	1.970** (2.17)	1.772*** (4.14)
Father's years of education received	0.178 (1.26)	0.088 (1.28)	0.056 (1.43)
Mother's years of education received	−0.054 (−0.30)	−0.012 (−0.15)	−0.008 (−0.16)
Famine *(ref: enough food)*			
Not enough food in childhood	−0.371 (−0.40)	−0.230 (−0.51)	0.353 (1.17)
Number of siblings during childhood	−0.404 (−1.13)	0.031 (0.23)	0.061 (0.85)
Family financial situation in childhood	−0.131 (−0.26)	−0.209 (−0.92)	0.125 (0.90)
Entry cohort fixed effects *(ref: 1964~78)*			
1979–89	−6.072*** (−4.11)	0.173 (0.12)	0.741 (0.78)
1990–99	−1.314 (−0.68)	1.109 (0.70)	1.450 (1.58)
2000–09	−8.447*** (−4.37)	−1.541 (−0.74)	1.450 (1.50)
2010–14	–	–	−0.763 (−0.72)
Constant	−18.830 (−0.78)	2.032 (0.26)	−10.655* (-−1.79)
Observations	359	575	756

Notes: Robust standard errors in parentheses; *** $p < .01$, ** $p < .05$, * $p < .1$

employed by collective enterprises, one often needs to receive some education. Those cadres and managerial staff in SOEs were usually more educated. In terms of marital status, the three groups are not significantly different from one another. Since our sample has only included those over 45 years old, we can expect most of the participants to be married.

We then look at childhood predictors. Compared to employee entrepreneurs, persistent entrepreneurs have a significantly smaller number of siblings when growing up. In regard to the first *hukou* status, persistent entrepreneurs and employee entrepreneurs are similar in their probability of having non-agricultural *hukou*. And both of them are significantly more likely to have non-agricultural *hukou* than farmer entrepreneurs. Other childhood predictors, which are parents' educational background, whether having experienced hunger, and family socio-economic status in childhood, were not significantly different among the three groups.

Life outcomes

We applied ordinary least square regression throughout the models to explore the different health outcomes and economic outcomes of the three types of entrepreneurs (employee, persistent and farmer entrepreneurs). Our results show that different self-employment trajectories were correlated to different outcomes in terms of health, while they do not differ significantly in economic outcomes. In addition, we have also confirmed that one's entrepreneurial outcomes capsulate the cumulative (dis) advantages of one's life history.

Health outcomes

Table 5 presents the self-rated health and mental of the sample. The two measurements for self-rated health have generally yielded similar results. Supporting the cumulative advantage theory, among all entrepreneurial paths, farmer entrepreneurs have the worst self-rated health. As shown in columns 5.1 and 5.2, with employee entrepreneurs as the reference group, farmer entrepreneurs have a significantly lower level of self-rated health, while persistent and employee entrepreneurs are not much different from one another. It is possible that the early laborious farming activities were detrimental to one's health outcomes, especially in the long term. In contrast, while many persistent entrepreneurs also came from rural areas, as represented by their rural *hukou* status, they escaped the laborious farming activities by starting their own businesses. Interestingly, the percentage of working time for being self-employed is not significantly related to one's self-rated health. Since the transition between being employed and self-employment is usually correlated to an increase in one's self-rated health, we would argue that such an increase might only be temporary. As entrepreneurs have gradually adjusted to their new lifestyle, the temporary rise in their health might quickly disappear.

In regard to the association between childhood predictors and self-rated health, we only observed that family income level in childhood is positively related to the first measurement of one's self-rated health. As shown in column 5.1, a relatively richer family background during childhood is beneficial to one's health in the long run. However, since this variable is only significant for the first measure of self-rated health, we are not sure of the robustness of the association. Other childhood predictors did not predict the self-rated health of Chinese entrepreneurs.

We then look at control variables. Generally, male entrepreneurs have better self-rated health than female entrepreneurs. Higher income might be positively associated with one's self-rated health. However, such an association is not robust, as shown in column 5.1.

Table 5: Self-rated health and depression

	(5.1)	(5.2)	(5.3)
	Self-rated health 1	Self-rated health 2	CES-D score
Entrepreneurial trajectories			
Persistent entrepreneurs	−0.282 (−0.52)	−0.325 (−0.41)	0.687 (0.88)
Employee entrepreneurs	ref	ref	ref
Farmer entrepreneurs	−0.342** (−2.13)	−0.353** (−2.56)	1.057 (1.21)
Age	−0.019** (0.001)	−0.026 (−0.87)	0.005 (0.05)
Income	0.019* (0.01)	0.014 (1.33)	−0.061 (0.05)
% of working time for being entrepreneurs	0.056 (0.21)	0.041 (0.18)	0.045 (1.26)
Male *(ref: female)*	0.234*** (2.94)	0.256*** (3.04)	−1.699*** (0.51)
Non-agricultural *hukou (ref: agricultural* hukou)	0.112 (0.12)	−0.005 (−0.04)	0.184 (0.66)
Live in urban area *(ref: live in rural area)*	0.021*** (0.09)	0.064 (0.67)	−0.663 (−1.29)
Years of education received	−0.006 (−0.46)	−0.022 (−1.56)	−0.190** (−2.42)
Married (ref: others)	−0.053 (0.13)	0.076 (0.56)	−3.595** (−2.26)
Childhood predictors			
First *hukou* was non-agricultural *(ref: first* hukou *was agricultural)*	−0.061 (0.15)	−0.0001*** (0.15)	0.907 (1.29)
Father's years of education received	0.008 (0.56)	0.008 (0.013)	−0.075 (−1.14)
Mother's years of education received	0.010 (0.60)	0.018 (0.002)	0.040 (0.52)
Not enough food in childhood *(ref: enough food)*	−0.009 (−0.10)	0.081 (0.98)	0.462 (0.96)
Number of siblings during childhood	0.022 (0.82)	0.018 (0.05)	0.090 (0.69)
Family financial situation in childhood	0.119** (0.05)	0.107** (2.25)	−0.238 (−0.99)
Constant	2.962** (2.41)	4.297*** (1.57)	9.399 (1.15)
Observations	1,023	1,023	1,235
R-squared	0.079	0.069	0.098
Entry cohort FE	YES	YES	YES

Notes: Robust standard errors in parentheses; *** $p < .01$, ** $p < .05$, * $p < .1$

The second indicator for one's health outcomes is depression. As shown in column 5.3, the three types of entrepreneurs do not significantly differ from one another in depressive symptoms. For a robustness check, we have also dichotomised the CES-D score, and the results were similar. It is possible that the cumulative advantage theory only applies to one's self-rated health, as the physical adversity experienced at an early stage may be more long-lasting than mental adversity. Previous studies have discovered that shifting from being employed to self-employment is likely to aggravate one's depression (Theorell et al, 1990; Andersson, 2008; Patzelt and Shepherd, 2011). However, combined with the non-significant results in this research, we may guess that the association between entrepreneurship and mental health could also be quite transient. Entrepreneurs may quickly adjust to their roles and thus do not

differ in the depressive symptoms between persistent entrepreneurs and other types of entrepreneurs.

Economic outcome

Table 6 presents the income differentials among the three types of entrepreneurs. Surprisingly, on average, the three types do not differ significantly in terms of income from self-employment. Another important measure for one's entrepreneurship, that is, the percentage of working time for being self-employed, does not predict one's income either. Living in urban areas and being married are positively associated with entrepreneurs' income, while having non-agricultural *hukou* in childhood and a lower level of mother's education are negatively associated with one's income.

While this result is somewhat surprising, as we might expect employee entrepreneurs to be the 'better off' group, we can think of several reasons to explain the results. First, if we only look at the coefficients, employee entrepreneurs do have the highest coefficient, followed by persistent entrepreneurs and farmer entrepreneurs. However, the coefficient is not statistically significant. Second, it is of course possible that the three entrepreneurial paths truly do not differ significantly in income. In this regard, shifting to self-employment is a good choice for farmers who otherwise would either stick to physical activities or become migrant workers who are often excluded from

Table 6: Economic outcome – Income from self-employment

	(6.1) Income
Entrepreneurial trajectories	
Persistent entrepreneurs	−1.202 (0.92)
Employee entrepreneurs	−1.432 (0.89)
Farmer entrepreneurs	*ref*
Age	−0.127*** (0.05)
% of working time for being entrepreneurs	−2.570** (1.04)
Male *(ref: female)*	1.163*** (0.50)
Non-agricultural *hukou (ref: agricultural* hukou)	0.314 (0.65)
Live in urban area *(ref: live in rural area)*	1.268*** (0.47)
Years of education received	−0.049 (0.07)
Married (ref: others)	1.627** (0.80)
Childhood predictors	
First *hukou* was non-agricultural *(ref: first* hukou *was agricultural)*	0.340 (0.80)
Father's years of education received	0.154* (0.08)
Mother's years of education received	−0.245** (−2.54)
Not enough food in childhood *(ref: enough food)*	−0.231 (−0.52)
Number of siblings during childhood	0.032 (0.25)
Family financial situation in childhood	0.169 (0.25)
Constant	7.365** (2.72)
Observations	1,023
R-squared	0.11
Entry cohort FE	YES

Notes: Robust standard errors in parentheses; *** $p < .01$, ** $p < .05$, * $p < .1$

the social circle at the destination. In contrast, entrepreneurship provides them with a more lucrative and potentially healthier work style.

Conclusion and discussion

This research expands the current scope of Chinese entrepreneurial studies by including the whole work history in the analysis. This research tackles two major questions for Chinese entrepreneurship since the Reform and Open Up. First, it looks at the typology of Chinese entrepreneurs, that is, the distinct groups of Chinese entrepreneurs based on their unique working trajectories. Second, it explores the life outcomes associated with each entrepreneurial group, especially the health and economic outcomes. Capitalising on a special wave of life history survey on Chinese older adults, that is, CHARLS (2014 and 2015), we plotted the full work history of all major types of Chinese entrepreneurs. With the help of sequence analysis, we successfully plotted out the four unique entrepreneurial trajectories in China, which are necessity entrepreneurs, persistent entrepreneurs, employee entrepreneurs and farmer entrepreneurs. Necessity entrepreneurs often only engaged in the workforce for a very short period of time and immediately left the workforce forever for other occupations, such as domestic work, as postulated by the significantly higher share of female portion in this group. Among the other three entrepreneurial clusters, as shown in cluster comparison, we can tell that (1) persistent entrepreneurs have engaged in entrepreneurship for the largest portion of their work life and are most likely to live in urban areas, (2) employee entrepreneurs tend to have a higher economic return and (3) farmer entrepreneurs have the highest likelihood of living in rural areas and to have agricultural *hukou* as the first *hukou* status.

Since necessity entrepreneurs had left the workforce for a substantial amount of time, we have only focused on the life outcomes of the other three groups. Possibly due to early laborious farming activities and lifelong adversities in many social aspects, farmer entrepreneurs have the worst self-rated health among the three trajectories. Persistent entrepreneurs and employee entrepreneurs do not differ significantly in self-rated health. At the same time, all three entrepreneurial trajectories displayed similar results in the level of depression. In terms of economic outcomes, all three entrepreneurial trajectories are not significantly different from one another, though employee entrepreneurs have a large but insignificant coefficient.

Methodologically, ours is the very first study to employ sequence analysis on entrepreneurial trajectories in China. While employment sequences are already seen in several papers focusing on European countries or the US, this thread of research has yet to receive much attention in Asian countries. In this regard, our research points to a whole new research venue in China.

Coming back to our hypotheses, we partially support *Hypothesis 1*, in which entrepreneurs previously engaging in farming activities tend to experience lifelong negative consequences in self-rated health. In regard to their economic return, we are unsure whether their economic return is the lowest. We also support *Hypothesis 3*, in which we observed a converging trend in depressive symptoms for entrepreneurs from various trajectories. We rejected *Hypothesis 2*, which argues that employee entrepreneurs should have the highest level of life outcomes in all aspects. Instead, as already mentioned, we did not observe significant differences in terms of depressive

symptoms and economic outcomes among the different trajectories. One potential reason is that our data set could not differentiate between entrepreneurs who were previously cadres or managerial staff from those who were previously laid-off workers, that is, employee entrepreneurs might represent a conglomeration of voluntary entrepreneurs and involuntary entrepreneurs.

Our results support both the cumulative advantage theory and the set-point theory. We extended the dichotomy of a cumulative advantage theory versus a set-point theory but pointed to the possibility that each theoretical framework can explain a specific dimension of life outcomes. Since we have observed significantly worse health outcomes for farmer entrepreneurs, we can support the cumulative (dis)advantage theory in the case of Chinese entrepreneurs. Engaging in a relatively high-status economic activity at a later life stage could not compensate for the early adversity and the long-time social exclusion in previous life stages. Similarly, employee entrepreneurs had probably started with a higher social position and social capital, which were then translated into better self-rated health in the long term. While the set-point theory is in contrast to the cumulative advantage theory, our findings support the set-point theory as well, that is, in the domains of depressive symptoms and economic outcome. Since all three entrepreneurial trajectories displayed similar levels of depression, we can argue that the changes in mental stress or life satisfaction after picking up entrepreneurship were indeed temporary. Chinese entrepreneurs from all work trajectories have all quickly adjusted to their new economic activity.

Our research has important policy implications. First, providing group-specific support measures for entrepreneurship is important. Different employment backgrounds may prompt them to start businesses in different industries and result in different scales of business. More tailor-made support measures can help their business to grow further. Second, in addition to financial support, the government also needs to pay more attention to the health outcomes of Chinese entrepreneurs, as many of them might not be covered by the social welfare system in urban areas. Additionally, possibly due to limited knowledge, many Chinese entrepreneurs, especially farmer entrepreneurs, might not be aware of the health supports available, even if there are some. The government may want to increase its publicity on related issues.

Future research may want to further complicate the sequence composition to better portray the details of each entrepreneurial cluster. For example, one can combine the employment sequence with the migration sequence to further divide the persistent entrepreneur cluster. One can also combine the employment sequence with the family history sequence to see how family formation may be related to one's entrepreneurship. With the increasing panel data collection, future research can pool consecutive waves of panel data to obtain better on-time measurements of entrepreneurs' states at different turns in the life sequence, which is not possible for retrospective life history data.

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[2] CHARLS Handbook is available on its official website: https://charls.pku.edu.cn/en/.

[3] Based on CHARLS data, the percentage of non-agricultural self-employment among the participants were 5.81%, 6.55% and 7.01% in 2011, 2013 and 2015, respectively. This shows a steady increase in the percentage of entrepreneurs among the Chinese workforces. Unfortunately, the Chinese government has not provided administrative data for entrepreneurs.

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Data availability

Interested scholars may apply for the China Health and Retirement Longitudinal Study (CHARLS) data set from Peking University.

Conflicts of interest

The authors declare that there is no conflict of interest.

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Appendix: medoid sequences

We here provide the medoid sequences to better delineate the different paths towards entrepreneurship. To speed up the process of OM calculation in Stata, we equalised the sequences by replacing states that did not contain any value with the 'no value' notation (N). 'No value' states are not missing values. Our employment sequence starts at 10 years old (T10) and ends at 65 years old (T65). While the earliest age of entering the workforce is ten in our data set, not all people entered the workforce at the same time. For example, if someone stayed in school and did not start working until 15 years old, T10 to T14 would be denoted as 'no value'. Similarly, if someone was only 60 at the time of the interview, then T61 to T65 would be 'no value'.

A: agricultural activities (employed and self-employed)
E: employed non-agricultural activities
S: self-employed non-agricultural activities
M: unpaid family helpers or military service
O: out of workforce
N: no value

Farmer entrepreneurs:
NNNNNNAAAAAAAAAAAAAAAAAA
AAAASSSSSSSSSSSSNNNNNNNNNNNNNN
Persistent entrepreneurs:
NNNNNNNNSSSSSSSSSSSSSSSSSSSSS
SSSSSSSSNNNNNNNNNNNNNNNNN
Employee entrepreneurs:
NNNNNNNNEEEEEEEEEEEEEEEE
EEEEEESSSSSSSSSSNNNNNNNNNNNNNNN
Necessity entrepreneurs:
NNNNNNNNSSSSSSSOOOEESOOOOOOOO
OOOOOOOOOOOOOOONNNNNNNNNNNN

While the first three entrepreneurial paths are all as predicted, necessity entrepreneurs are somehow out of our expectations. According to the CHARLS questionnaire, one needs to leave the workforce for 12 continuous months in order to be considered as

Table A1: Ten-item CES-D questionnaire

No.	Question – How often did the respondent …
1	I was bothered by things that don't usually bother me.
2	I had trouble keeping my mind on what I was doing.
3	I felt depressed.
4	I felt everything I did was an effort.
5	I felt hopeful about the future (reverse coding).
6	I felt fearful.
7	My sleep was restless.
8	I was happy (reverse coding).
9	I felt lonely.
10	I could not get 'going'.

being 'out of workforce'. In this way, those who had only briefly left the workforce for less than a year were not recorded as being 'out of workforce' in our sequences. For example, if a female worker had temporally left the workforce for six months due to pregnancy but rejoined the workforce immediately after giving birth, she would not be marked as being 'out of workforce' in our study. At the same time, as showed by the medoid sequence, it is possible that the necessity entrepreneurs had only briefly engaged in entrepreneurship and then were out of the workforce again. In this regard, compared to the other three types of Chinese entrepreneurs, necessity entrepreneurs generally only engaged in entrepreneurship temporally. This also explains why we only examined the life outcomes of the other three types of Chinese entrepreneurs.