



Leave behind or migrate? Evidence from a field experiment in China concerning the impact of being left behind/migrating status on children's behaviour and preferences

Jun Luo^a, Xinxin Wang^{b,*}

^a Center for Economic Behavior and Decision-making (CEBD) and School of Economics, Zhejiang University of Finance and Economics, China

^b School of Economics, Zhejiang University of Finance and Economics, China

ARTICLE INFO

JEL:
C93
J13
J61

Keywords:

Left-behind children
Migrant children
Field experiment
Prosocial behaviour
Economic decision-making

ABSTRACT

With the great economic and social development achieved in China in the past 40 years of reform and opening up has come the extensive flow of China's very large rural labour force between urban and rural areas and among regions, as well as populations of left-behind children and migrant children who cannot be ignored. In this paper, four populations—non-left-behind children in rural areas, left-behind children in rural areas, migrant children in urban areas, and local children in urban areas—were recruited in a large-scale field experiment that included the dictator game, ultimatum game, trust game, public goods game, coin-tossing task, intertemporal choice task, a calculation contest task, and a gambling task. Both being left behind and migrating had a negative effect on the children's prosocial behaviour (including fairness, trust, trustworthiness, cooperation, and honesty) and economic decision-making (including time and competition preferences). Moreover, the effect on migrant children was relatively greater, but this effect dissipated progressively as time since migration increased. Additionally, shorter migration distances were associated with a decreased effect of migration on migrant children, and having access to one parent had a positive effect on left-behind children.

1. Introduction

Since China's reform and opening up, the innovation of the rural institution and the advancement of China's industrialisation and urbanisation, the surplus rural labour force has flowed toward cities in a steady stream. As of 2019, the number of rural migrant workers in China had reached 174 million ([National Bureau of Statistics of the People's Republic of China, 2019](#)). Some children of these workers followed their parents into the cities and became migrant children, whereas the others remained in their rural hometowns to be raised by their grandparents and became left-behind children. The United Nations Children's Fund in 2015 estimated that approximately 100 million migrant and left-behind children live in China.

Children who migrate face an unfamiliar environment and must adapt to various changes and integrate into a new life. Meanwhile, their parents do not have the same access as local urban residents in terms of their children's education, medical care, housing, and other social welfare guarantees. This causes many migrant children to lack a sense of security and belonging, leading to psychological imbalance and misbehaviour ([Chen & Feng, 2013](#); [Kouider, Koglin, & Petermann, 2014](#); [Portes & Rivas, 2011](#); [Stevens & Vollebergh,](#)

* Corresponding author at: Zhejiang University of Finance and Economics, Xueyuan Street 18, Hangzhou 310018, China.
E-mail addresses: luojun@zufe.edu.cn (J. Luo), xxwang@zufe.edu.cn (X. Wang).

2008).

A substantial share of the migrant population is unable to access social services for their children at their destination, such as enrolling their children in school in the city, and these parents have to leave their children in the countryside, creating left-behind children. Because the left-behind children are unable to live with their parents for a long time, changes occur in the internal family structure, the children may experience problems with education, psychological health, emotional life, and socialisation (Bai et al., 2017; Chang, Dong, & MacPhail, 2011; Fan, Su, Gill, & Birmaher, 2010; Lei, Liu, & Hill, 2017; Zhao, Wang, Li, Zhou, & Hesketh, 2016).

Migrant and left-behind children are two special populations that have emerged since the rapid urbanisation of China. These two populations may encounter unique challenges due to their external environment or changes in family structure (Hu, Lu, & Huang, 2014) that may influence children's prosocial behaviour and economic decision-making, creating a greater gap between such "disadvantaged" children's groups and urban local children. There is still little empirical evidence to show behavioural differences between these two populations and other populations. Only in the last few years have experimental studies begun to analyse the behaviours and preferences of migrant and left-behind children in China. For example, recent literature investigated the performance of local elementary school students and students who migrated from other places under an incentive mechanism (Afridi, Li, & Ren, 2015), along with their distribution behaviour (Luo, Chen, He, & Gao, 2019) and trust behaviour (Luo & Wang, 2020). Other studies compared the differences between left-behind children in rural areas and urban children in terms of altruistic (Cadsby, Song, & Yang, 2019), honest (Cadsby, Song, & Yang, 2020), and cooperative (Zhou, Chen, & Volland, 2022) behaviour.

These studies provided strong evidence of differences in the preferences and behaviours of migrant or left-behind children separately compared to rural or urban local children, but we still lack evidence on differences between migrant and left-behind children's behaviours. This study investigated the effects of being left behind or migrating on children's prosocial behaviour and economic decision-making. We used field experiment methods to recruit more than 1000 participants and conducted eight behavioural games and individual decision-making experiments—the ultimatum game, dictator game, trust game, public goods game, honesty, time preference, competition preference, and risk preference experiments—to measure altruism, fairness, trust, cooperation, honesty, competition, risk, and time preferences among migrant children in urban areas and left-behind children in rural areas.

We also included local children in urban areas and non-left-behind children in rural areas to comprehensively investigate the effects of migration and being left behind on children's behaviour and preferences. In addition, we considered relevant factors, such as the migration distance of the migrant children (in a city or province, outside a province), time since migration, circumstances of left-behind children (neither parent remained at home, mother remained at home, father remained at home), frequency of seeing their parents face-to-face, and the amount of time spent with parents, in the empirical analysis to further explore the internal mechanisms underlying the effects of migrating and being left behind on children's behaviour and preferences.

The experimental results revealed that left-behind children in rural areas showed significantly less prosocial behaviour than non-left-behind children in rural areas in terms of trust behaviour, trustworthy behaviours, honesty, and competition preference. Migrant children also showed significantly less prosocial behaviours than non-left-behind children in rural areas in terms of sense of fairness, trust behaviour, trustworthy behaviour, cooperation, and honesty, but they showed a significantly higher preference for future benefits. Relative to local children in urban areas, migrant children in urban areas showed significantly less altruistic sharing behaviour and had significantly lower levels of fairness, trust, and trustworthiness while showing a significantly higher preference for future benefits. Living with their mother significantly increased the sense of fairness and honesty of left-behind children; living with their father significantly increased their honesty, competition preference, and risk preference. Compared with children who migrated in a city, children who migrated in a province showed significantly lower investment in trust games. Children who migrated outside a province showed significantly lower altruistic giving, trust behaviour, trustworthy behaviour, and cooperation. With increased time since migration, migrant children's prosocial behaviours, such as altruistic giving, sense of fairness, trust behaviour, trustworthiness, and cooperation, all increased significantly.

The remaining parts of this paper are arranged as follows: Section 2 describes the experimental design and introduces the participants, experiment implementation, and experimental tasks; Section 3 presents the experimental results; and Section 4 features the discussion and conclusion.

2. Experimental design

2.1. Participants

The participants in our experiments were left-behind rural children (including those for whom both parents were working elsewhere, their father was working elsewhere, or their mother was working elsewhere) and non-left-behind rural children (both parents were at home) in Kaihua County, Quzhou City, Zhejiang Province,¹ as well as migrant children who migrated with their parents from the countryside to a city (Hangzhou; including migration from rural Hangzhou to Hangzhou city, migration from a village outside

¹ According to statistical data, in 2018, the per capita disposable income in Kaihua County was CNY 24,459, ranking toward the bottom among counties in Zhejiang Province. In addition, the per capita disposable income of rural residents in Kaihua County was only CNY 17,283. Although the household registration population of the county was 362,000 people, the permanent population was only 255,000 people, because more than 100,000 people were engaged in migrant work. Hangzhou was the main site to which residents relocated for migrant work. Therefore, we selected Kaihua County as the sampling location for left-behind and non-left-behind rural children and Hangzhou as the sampling location for migrant children in an urban area and children with a household registration in the city.

Hangzhou but in Zhejiang Province to Hangzhou, and migration from a village outside Zhejiang Province to Hangzhou) and local children with an urban (Hangzhou) household registration (as shown in Table 1).

After acquiring informed consent from the school and parents, students in fourth through sixth grades were recruited voluntarily.² In accordance with the student roster provided by the schools, recruited participants were balanced in terms of grade, class, and gender for every session. We recruited 600 left-behind rural children and non-left-behind rural children from three elementary schools in Kaihua County, Quzhou City, Zhejiang Province, and recruited 480 migrant children in an urban area and children with an urban household registration from two elementary schools in Shangcheng District, Hangzhou, Zhejiang Province.

We conducted a power analysis to assess the adequacy of our sample size regarding the mean tests presented in the results section. The sample size was sufficient to detect large effects; power: $1 - \beta = 0.90$; significance level: $\alpha = 0.05$; effect size: Cohen's $d = 0.63$; two-tailed sample size = 26.77; one-tailed sample size = 21.82). Therefore, based on our sample size, the power of the experiment was strong enough.

2.2. Experiment implementation

The experiment sites were spacious places, such as a large conference room, cafeteria, or large classroom at the school. The participants were separated by at least one seat, and communication with one another was prohibited. The participants were randomly seated and isolated; thus, they could not chat with others or glance at their answers. Each participant receiving printed materials regarding an anonymity declaration, instructions, and payment rules of the experiment, with the experimenter reading the materials aloud to ensure that all participants understood them.

We chose a general holiday on a Tuesday afternoon so students had free time at school to conduct our experiment. The experiment was conducted using paper and pencil, and the experimenter was responsible for communicating with participants during the experiment. We randomly paired participants for a decision-making game, and the subjects did not know with whom they were paired. We used strategic methods to elicit game decisions. We did not reveal the attributes of the participants in terms of whether they had been left behind or migrated in the experiment. We arranged participants with different attributes and from different grades and classes at the same site to conduct the experiment. The participants did not know the attributes of their partner or the purpose of the research. They cannot guess the research purpose.

Then, we used a within-subject experimental design (see Charness, Gneezy, & Kuhn, 2012) to perform eight experimental tasks successively, and the participants did not know about the subsequent tasks. We recruited six experimenters from our university, who completed multiple training sessions before implementation of the experiment. The training content included duties, tasks, and precautions related to the experimenter role to ensure they were consistent in their language expression and experimental procedure. All experimenters were not local and unacquainted with the participants. After each experimental task, the next experimental task began soon to reduce the influence of the results of the completed experiment on decision-making in the subsequent experiment as much as possible. Additionally, the participants did not learn of their opponents' decisions in the games until all experimental tasks had ended to avoid a carry-over effect as much as possible.

The payoffs for each task were not revealed until the end of the experiment. After the experiment ended, the students were required to complete questionnaires that included information about their demographic characteristics, family situation, psychological features, personality, and other questions. Cash was used as an incentive for the experiment; after completing the questionnaires, the participants immediately received remuneration for participating in the experiment. The experiment lasted 1 h in total, and on average, participants received 30.25 RMB (roughly \$4.40 USD). Moreover, we collected family and guardian information through the questionnaire, including demographic characteristics, education level, income level, household registration, and migrant work situation of parents and whether the parents lived with the children.

2.3. Experimental tasks

The behavioural experiments included behavioural games and individual decision-making experiments. The behavioural games were standard or designed for this study. Specifically, we used the giving amount in the dictator game to test the level of altruism (Eckel & Grossman, 1996; Forsythe, Horowitz, Savin, & Martin, 1994); offer amount in the ultimatum game to test the sense of fairness (Bolton & Zwick, 1995; Güth, Schmittberger, & Schwarze, 1982; Roth, Prasnikar, Okuno-Fujiwara, & Zamir, 1991); investment amount in the trust game to test the level of trust (Berg, Dickhaut, & McCabe, 1995; Burks, Carpenter, & Verhoogen, 2003); return rate to test trustworthiness (Johnson & Mislin, 2011; Schwieren & Sutter, 2008); contribution amount in the public goods game to test the level of cooperation (Fehr & Gächter, 2000; Fehr & Schmidt, 1999; Isaac & Walker, 1988); and losses in the coin-tossing task to test the level of honesty (Abeler, Becker, & Falk, 2014; Buccioli & Piovesan, 2011; Houser, Vetter, & Winter, 2012).

To test time preferences, we designed an intertemporal choice task in which the participants had to choose from five options ranging from obtaining a small amount of money right then to obtaining a large amount of money 4 weeks later. The longer participants chose to wait, the larger the amount they could obtain. To test competitive preferences, we designed a calculation contest task modified from Leibbrandt, Gneezy, and List (2013). The participants were paired randomly, and each participant was asked to decide whether to compete with their partner in a subsequent calculation contest. If the participant chose to compete, they would obtain a

² Because students in the lower grades of elementary school may not have been able to understand the rules and process of the experiments, we selected only elementary school students in fourth to sixth grades.

Table 1
Basic composition of participants.

Participant type	School location	<i>n</i>	Composition
Rural non-left-behind	Kaihua County, Quzhou City, Zhejiang Province	180	Both parents at home
Rural left-behind	Kaihua County, Quzhou City, Zhejiang Province	420	Parents gone: 211 Father gone: 152 Mother gone: 57
Urban migrant	Shangcheng District, Hangzhou City, Zhejiang Province	300	Rural Hangzhou: 72 Rural Zhejiang: 150
Urban local	Shangcheng District, Hangzhou City, Zhejiang Province	180	Rural outside Zhejiang: 78 Urban Hangzhou

reward if they won. If the participant chose not to compete, their payoff would be based solely on their performance, which would be lower than the competition reward. To test risk preferences, we designed a gambling task modified from Rogers et al. (1999). The participants had to guess the colour of a ball randomly from seven red balls and three blue balls. The bonus for winning was small for red and large for blue.

3. Results

3.1. Descriptive statistics and nonparametric test

Before comparing and analysing the behavioural decision-making of these four populations—non-left-behind rural children, left-behind rural children, migrant children in an urban area, and children with an urban household registration—the effects of gender and grade on the results of the experiment were considered. Kruskal-Wallis test results showed no significant differences in the four groups in terms of the proportions of female and male participants in each grade (see Appendix Table 1). We determined the participants' behaviours and preferences through their performance in the decision-making tasks. Data for the four groups in the eight experimental tasks are presented in Appendix Table 2 and Fig. 1.

We carried out a pairwise comparative analysis of the behaviour and decision-making of the four elementary student populations in terms of altruism, fairness, trust, trustworthiness, cooperation, honesty, time, competition, and risk preference (see Appendix Table 3).

The results of multiple hypothesis testing indicated by List, Shaikh, and Xu (2019) showed that the amount of altruistic giving by urban children was significantly higher than that of non-left-behind rural children, left-behind rural children, and migrant children ($p < .01$). The proposed amount by non-left-behind rural children was significantly higher than that of left-behind rural children ($p < .05$), and the proposed amount by migrant children was significantly lower than that of non-left-behind rural children ($p < .01$), left-behind rural children ($p < .05$), and urban children ($p < .01$).

The investment amount by non-left-behind rural children was significantly higher than that of left-behind rural children ($p < .10$), and the amount of investment by migrant children was significantly lower than that of non-left-behind rural children ($p < .01$), left-behind rural children ($p < .01$), and urban children ($p < .10$). The return rate on trustworthiness for migrant children was significantly lower than that of non-left-behind rural children ($p < .01$), left-behind rural children ($p < .05$), and urban children ($p < .01$). The cooperation level of migrant children was significantly lower than that of non-left-behind rural children ($p < .05$) and left-behind rural children ($p < .10$), and the cooperation level of urban children was significantly lower than that of non-left-behind rural children ($p < .01$) and left-behind rural children ($p < .05$). The honesty of left-behind rural children was significantly lower than that of non-left-behind rural children, urban children, and migrant children ($p < .01$), whereas the honesty of migrant children was significantly lower than that of non-left-behind rural children ($p < .05$).

Compared with non-left-behind rural children ($p < .05$), migrant children ($p < .01$), and urban children ($p < .05$), left-behind rural children had a greater preference for current benefits. Compared with non-left-behind rural children and urban children ($p < .01$), migrant children had a greater preference for future benefits. In addition, left-behind rural children were less willing to compete than non-left-behind rural children, migrant children, and urban children ($p < .01$). There were no significant differences in risk preference between the four groups of children.

3.2. Regression analysis

This section reports on the effects of left-behind status, migration, and urban household registration on children's behaviours and preferences. Moreover, the effects of different left-behind states (both parents absent, mother at home, father at home) and distance of and time since migration on the children's behaviours and preferences were considered.

3.2.1. Main regression model

After conducting a pairwise test on the behaviours and preferences of the four elementary student populations, we considered the effects of being left behind, migration, and household registration on the children's behaviours and preferences with a regression model. The elementary students' behavioural decisions during the experiments (allocation amount, proposed amount, investment amount, return rate, contribution amount, honesty, intertemporal benefit choice, competition decision, risk choice) were used as the explained variables (Y_i) in the model. Non-left-behind rural children were the reference group, and being left behind ($Left_i$), migration

(*Migrate_i*), and urban household registration (*Hukou_i*) were used as the main explanatory variables to investigate the effects of the presence of parents, regional mobility, and household registration identity on the children's behaviours and preferences.

Left-behind children refer to children whose parents left to work for more than 3 consecutive months in their hometown, where their household registration was located, and who were unilaterally supervised by their parents or other relatives. We defined migrating children as those whose place of residence was inconsistent with their household registration and who had been away from their place of household registration for more than half a year. We measured these outcomes through school rosters.

$$Y_i = \beta_0 + \beta_1 Left_i + \beta_2 Migrate_i + \beta_3 Hukou_i + \beta_4 School_i + X_i + \varepsilon_i$$

Additionally, we included gender, age, grade, number of siblings, and other individual characteristics³ (X_i) and the fixed effects of the school in the regression model (see Table 2).

The regression results show that left-behind status led to significant decreases of 0.45 yuan in children's levels of trust behaviour and 0.06 yuan in trustworthy behaviour, alongside decreased honesty and competition preference. The results reveal that migration status significantly decreased children's sense of fairness by 0.66 yuan, levels of trust behaviour by 1.21 yuan, trustworthy behaviour by 0.12 yuan, and cooperation level by 0.56 yuan, along with a significant decrease in honesty and increase in future benefit preference. Compared with non-left-behind children with a rural household registration, children with an urban household registration had significantly higher altruistic sharing behaviour (0.74 yuan) and lower cooperative behaviour (0.69 yuan).

3.2.2. Effects of left-behind status

We further analysed the effect of left-behind status on children's behaviours and preferences. Among left-behind children, three main conditions were considered: both parents engaged in migrant work away from home, father engaged in migrant work away from home with mother at home, and mother engaged in migrant work away from home with father at home. Therefore, children with both parents engaged in migrant work were used as the reference group in the regression model to investigate possible differences in the children's behaviours and preferences resulting from the presence of their mother or father. We also included the frequency with which the parents saw their children in person and the number of days per year that the children were with their parents as influencing factors regarding the behaviours and preferences of the left-behind children (see Table 3).

$$Y_i = \beta_0 + \beta_1 Mother_i + \beta_2 Father_i + \beta_3 Frequency_i + \beta_4 Together_i + \beta_5 School_i + X_i + \varepsilon_i$$

The regression results show that compared with left-behind children with both parents absent, those whose mothers remained with them had a significantly increased level of fairness and honesty. Compared with left-behind children with both parents absent, those whose fathers remained with them had significantly increased honesty, competition preference, and risk preference. In addition, increases in the frequency with which the parents saw the children in person and the number of days the parents and children were together significantly increased the levels of cooperation and honesty of left-behind children.

3.2.3. Effects of migration and mobility

Participants who migrated with migrant worker parents from the countryside to the city encountered three situations—migration from rural to urban areas of Hangzhou (migration in the city), migration from rural areas in Zhejiang Province other than Hangzhou to urban areas of Hangzhou (migration in the province), and migration from rural areas outside Zhejiang Province to urban areas of Hangzhou (migration outside the province). We used children who had migrated in the city as the baseline group to investigate whether differences in migration distance affected the children's behaviours and preferences through regression analysis.

$$Y_i = \beta_0 + \beta_1 Year_i + \beta_2 Inprovince_i + \beta_3 Outprovince_i + \beta_4 School_i + X_i + \varepsilon_i$$

In addition, we included how long it had been since the children migrated with their parents from rural areas to the city in the regression model to further explore whether the effects of migration on the children's behaviours and preferences changed based on time (as shown in Table 4).

The regression results show that compared with children who migrated in the city, children who migrated in the province had significantly lower amounts of investment in the trust game and were less willing to compete. Compared with children who migrated in the city, those who migrated outside the province had a significantly lower allocation amount, investment amount, return rate on being trustworthy, and contribution in the behavioural games and were less willing to compete. In addition, as the duration time of migration increased, the migrant children's allocation amount, proposed amount, investment amount, return rate on being trustworthy, and contribution amount all increased significantly.

We selected the data the children who had migrated from rural areas to the city more than 2 years ago and used data from non-left-behind rural children as the baseline group to investigate whether differences existed in terms of behaviours and preferences (regression results shown in Table 5).

Compared with non-left-behind rural children, migrant children had a significantly lower proposed amount, investment amount, return rate, and contribution and showed significantly lower levels of other prosocial behaviour. When only data for migrant children

³ We put pocket money into the regression model as a control variable because it may have affected their behavioural decisions in experiments with payment-induced value.

Table 2
Regression analysis of individual behaviours and preferences.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Allocate	Propose	Invest	Return	Cooper	Honest	Time	Compete	Risk
Left-behind	-0.03 (0.22)	-0.23 (0.20)	-0.45* (0.26)	-0.06** (0.02)	-0.15 (0.25)	0.62*** (0.12)	-0.18 (0.18)	-0.58*** (0.16)	0.13 (0.16)
Migrant	-0.02 (0.27)	-0.66*** (0.25)	-1.18*** (0.30)	-0.11*** (0.03)	-0.53* (0.31)	0.22** (0.11)	0.81*** (0.16)	0.10 (0.19)	0.23 (0.20)
Urban hukou	0.74*** (0.28)	0.03 (0.24)	-0.43 (0.32)	-0.02 (0.03)	-0.69** (0.32)	0.05 (0.12)	0.16 (0.18)	0.35 (0.22)	0.25 (0.22)
Female	0.04 (0.16)	0.28* (0.14)	0.01 (0.17)	-0.00 (0.02)	0.24 (0.20)	0.01 (0.07)	-0.01 (0.11)	0.06 (0.12)	-0.32** (0.13)
Grade	0.15 (0.09)	-0.00 (0.09)	0.08 (0.10)	0.02 (0.01)	0.09 (0.12)	-0.02 (0.04)	-0.06 (0.07)	-0.07 (0.07)	0.15* (0.09)
Siblings	-0.06 (0.11)	0.10* (0.03)	-0.07 (0.06)	0.00 (0.01)	-0.05 (0.08)	-0.01 (0.02)	-0.06* (0.03)	0.06 (0.05)	0.00 (0.04)
Pocket money	-0.02* (0.01)	-0.01 (0.02)	0.00 (0.02)	-0.00 (0.00)	-0.01 (0.02)	-0.01 (0.01)	-0.00 (0.01)	-0.04* (0.01)	-0.01 (0.01)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.48** (0.75)	3.40*** (0.60)	4.68*** (0.82)	0.61*** (0.12)	6.25*** (1.03)	3.10*** (0.33)	1.02* (0.56)	-0.88** (0.65)	2.10*** (0.75)
N	540	540	540	540	1080	1080	1080	1080	1080

Note. Robust standard errors at the school level are shown in the parentheses.
* $p < .10$. ** $p < .05$. *** $p < .01$.

Table 3
Analysis of influences on the behaviours and preferences of left-behind children.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Allocate	Propose	Invest	Return	Cooper	Honest	Time	Compete	Risk
Mother at home	0.04 (0.26)	0.42** (0.21)	0.33 (0.25)	-0.03 (0.04)	-0.35 (0.32)	-0.70*** (0.12)	0.01 (0.18)	0.18 (0.22)	0.16 (0.22)
Father at home	0.32 (0.40)	0.35 (0.28)	0.08 (0.33)	-0.08 (0.06)	-0.42 (0.45)	-0.95*** (0.15)	-0.35 (0.25)	0.05* (0.33)	0.76** (0.36)
Frequency of meeting	-0.08 (0.12)	-0.06 (0.10)	0.09 (0.13)	0.01 (0.02)	0.21** (0.17)	-0.01** (0.05)	0.06 (0.09)	0.11 (0.11)	0.20 (0.12)
Days together	-0.05 (0.20)	0.02 (0.14)	0.06 (0.16)	-0.01 (0.03)	0.26*** (0.22)	-0.05** (0.07)	0.02 (0.12)	-0.03 (0.14)	0.05 (0.14)
Female	0.09 (0.26)	0.21 (0.19)	-0.04 (0.25)	0.02 (0.03)	0.37 (0.32)	0.20** (0.09)	0.16 (0.17)	0.15 (0.21)	-0.47** (0.21)
Grade	0.40*** (0.14)	0.04 (0.12)	0.17 (0.16)	0.04 (0.03)	0.27 (0.18)	-0.02 (0.05)	0.10 (0.10)	-0.07 (0.12)	0.17 (0.12)
Siblings	-0.10 (0.19)	0.03 (0.06)	0.09 (0.09)	0.02* (0.01)	-0.06 (0.13)	0.00 (0.03)	-0.03 (0.07)	0.12 (0.08)	0.01 (0.08)
Pocket money	-0.03** (0.01)	-0.03 (0.04)	0.05** (0.02)	0.00* (0.00)	-0.03 (0.03)	0.00 (0.01)	0.00 (0.02)	-0.04* (0.02)	-0.00 (0.02)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.25** (1.12)	3.72*** (0.88)	5.22*** (1.33)	0.45** (0.22)	7.68*** (1.56)	3.86*** (0.46)	0.45** (0.88)	-2.32** (1.05)	1.06** (1.06)
N	210	210	210	210	420	420	420	420	420

Note. Robust standard errors at the school level are shown in the parentheses.
* $p < .10$. ** $p < .05$. *** $p < .01$.

who had migrated more than 2 years ago were considered, we found that they performed significantly lower than non-left-behind rural children only in honesty, and they were more willing to choose future income. In terms of other prosocial behaviour and economic decisions, there were no significant differences between migrant children who had migrated more than 2 years ago and the non-left-behind rural children.

4. Discussion and conclusion

For the hundreds of millions of rural migrant workers who enter cities in China, the decision to leave their children behind in the rural areas or migrate with them requires careful consideration. These workers need to consider not only the safety of the children left behind in the rural areas and the education of children who migrate with them into the cities, but also whether the long-term lack of parental companionship will affect their children's behaviours and preferences or moving their children to a city will lead to behavioural changes due to an inability to adapt to changes in the external environment. These microlevel issues of psychology and

Table 4
Analysis of influences on the behaviours and preferences of migrant children.

Variables	(1) Allocate	(2) Propose	(3) Invest	(4) Return	(5) Cooper	(6) Honest	(7) Time	(8) Compete	(9) Risk
Time since migration	0.05* (0.10)	0.06* (0.10)	0.12** (0.10)	0.02* (0.01)	0.06* (0.13)	-0.02 (0.04)	0.01 (0.06)	-0.05 (0.07)	-0.09 (0.07)
In Zhejiang	-0.03 (0.40)	-0.09 (0.40)	-0.70* (0.40)	-0.03 (0.05)	0.50 (0.53)	0.07 (0.16)	-0.46 (0.26)	-0.06* (0.30)	0.88 (0.31)
Outside Zhejiang	-0.25* (0.49)	-0.03 (0.43)	-0.80* (0.47)	-0.05* (0.05)	-0.29** (0.60)	0.16 (0.18)	-0.11 (0.30)	-0.30* (0.33)	-0.03 (0.34)
Female	0.12 (0.32)	0.58* (0.32)	0.10 (0.33)	-0.05 (0.04)	0.33 (0.43)	-0.16 (0.13)	-0.54* (0.22)	-0.19 (0.24)	0.02 (0.26)
Grade	0.00 (0.19)	-0.05 (0.19)	-0.06 (0.18)	0.04* (0.02)	-0.12 (0.26)	0.13* (0.08)	-0.10 (0.14)	-0.08 (0.15)	0.19 (0.19)
Siblings	-0.35* (0.11)	0.09 (0.08)	-0.28* (0.16)	0.00 (0.01)	-0.25** (0.12)	-0.09* (0.05)	-0.08 (0.08)	-0.16* (0.10)	0.07 (0.10)
Pocket money	-0.00 (0.02)	0.00 (0.03)	-0.01 (0.02)	-0.01 (0.00)	-0.01 (0.04)	-0.02* (0.01)	-0.03 (0.02)	-0.08* (0.03)	0.02 (0.02)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.82 (1.40)	2.66 (1.86)	2.72* (1.48)	0.65*** (0.21)	4.32** (2.06)	3.55*** (0.62)	2.88*** (1.05)	1.26 (1.18)	2.52 (1.82)
N	150	150	150	150	300	300	300	300	300

Note. Robust standard errors at the school level are in parentheses.
* $p < .10$. ** $p < .05$. *** $p < .01$.

Table 5
Analysis of influences on the behaviours and preferences of long-term migrant children.

Variables	(1) Allocate	(2) Propose	(3) Invest	(4) Return	(5) Cooper	(6) Honest	(7) Time	(8) Compete	(9) Risk
Long-term migrant	-0.01 (0.32)	-0.50 (0.29)	-0.76 (0.37)	-0.08 (0.04)	-0.60 (0.39)	0.22* (0.13)	1.01** (0.20)	-0.02 (0.23)	0.16 (0.24)
Female	0.01 (0.31)	0.32 (0.30)	-0.48* (0.36)	-0.01 (0.04)	0.22 (0.37)	-0.06 (0.13)	-0.39 (0.19)	-0.34 (0.23)	-0.02 (0.23)
Grade	0.05 (0.18)	-0.06 (0.21)	0.15 (0.22)	-0.01 (0.02)	0.08 (0.22)	-0.07 (0.08)	-0.34* (0.12)	-0.08 (0.14)	0.05 (0.18)
Siblings	0.11 (0.12)	0.15* (0.07)	-0.14* (0.08)	-0.00 (0.01)	-0.06 (0.10)	-0.02 (0.03)	-0.04 (0.06)	-0.00 (0.07)	0.01 (0.06)
Pocket money	-0.05* (0.03)	-0.04 (0.04)	-0.01 (0.03)	-0.00 (0.00)	-0.01 (0.04)	0.01 (0.02)	-0.02 (0.03)	-0.02 (0.03)	-0.03 (0.03)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.38** (1.52)	1.86** (1.56)	5.10*** (1.59)	0.56*** (0.18)	5.32*** (1.90)	2.85*** (0.61)	0.45** (0.92)	-0.01** (1.15)	2.50* (1.52)
N	164	161	159	166	325	325	325	325	325

Note. Robust standard errors at the school level are in parentheses.
* $p < .10$. ** $p < .05$. *** $p < .01$.

behaviour are imperceptibly influenced by such events and often neglected; however, once changes have occurred, the effects are far reaching and of great significance, whether to a single family or the entire country.

We used a field experiment to comprehensively analyse behavioural manifestations in children who were left behind in a rural area and children who migrated to a city in terms of altruism, fairness, trust, trustworthiness, cooperation, honesty, individual time preference, competition preference, and risk preference. We also included non-left-behind rural children and children with urban household registration as experimental participants and used the former as the baseline group in a regression analysis to investigate the effects of left-behind status, migration and mobility, and urban household registration on children's behaviours and preferences.

We performed subgroup analyses of left-behind children and investigated the effects of different left-behind states (both parents engaged in migrant work away from home, father engaged in migrant work away from home, and mother engaged in migrant work away from home), number of days the children spent in the company of their parents, and frequency with which the children saw their parents in person on the behaviours and preferences of left-behind children. For migrant children, we also analysed the relationship between duration since migration and migration distance (in the city, in the province, outside the province) on the children's behaviours and preferences.

The results of our experiment showed that compared with non-left-behind rural children, left-behind rural children had significantly lower trust behaviour, trustworthy behaviour, honesty, and competition preference. In comparison, migrant children showed significant decreases in sense of fairness, trust behaviour, trustworthy behaviour, cooperation level, and honesty compared with non-left-behind rural children, but their preference for future income was significantly higher. Relative to non-left-behind children with

rural household registration, children with urban household registration had significantly higher altruistic sharing behaviour and significantly lower levels of cooperation. In addition, compared with the other child populations, migrant children had significantly lower amounts of allocation, trust behaviour, trustworthy behaviour, cooperation level, and other prosocial behaviour.

Further experimental evidence suggests that compared with left-behind children who lived with neither parent, living with their mother significantly increased the sense of fairness and honesty among left-behind children, whereas living with their father significantly increased their honesty, competition preference, and risk preference. Previous research showed that girls are more prosocial than boys and that boys have a greater preference for risk and competition than girls (Croson & Gneezy, 2009; Eckel & Grossman, 2008; Espinosa & Kovárík, 2015). Our research conclusion seems to verify the effect of the parents' behaviours and preferences on the left-behind children's behaviour; for example, Dong and Zhao (2019) also found that the father's companionship is more important to the formation of a competition preference in children.

We also found that compared with children who migrated in the city, children who migrated in the province invested a significantly lower amount in the trust game, whereas children who migrated outside the province had a significantly lower altruistic allocation, investment in trust, return rate on being trustworthy, and contribution; that is, the farther the migration distance, the lower the child's level of prosocial behaviour. The conclusion of this paper is consistent with the group identity theory of social psychology (Tajfel, Billig, Bundy, & Flament, 1971; Turner, Brown, & Tajfel, 1979) and Akerlof and Kranton's (2000) utility model of identity based on social distance, which was based on group identity theory. In addition, there was no significant difference between non-left-behind rural children and children who had migrated more than 2 years ago in terms of most prosocial behaviours and economic decisions. This illustrates that children's behaviour shows strong adaptability and plasticity in response to changes in the external environment (Wexler, 2008) and that the negative effects of migrating to an unfamiliar environment will gradually improve.

Through large-scale experimental evidence, this paper showed that left-behind status and migration affect children's prosocial behaviour and economic decisions; furthermore, migrant children are more greatly affected, but these effects dissipate as time since migration increases. Shorter migration distances were associated with a decrease in migration's effects on children. The company of one parent had a positive effect on left-behind children.

Our research provides micro-level evidence of the effects of urbanisation on the children of workers who migrate to cities. We comprehensively investigated differences in various preferences and behaviours of migrant or left-behind children separately compared to rural or urban local children. These findings suggest that we should establish and improve an integration mechanism between urban and rural areas. On one hand, we should ensure equal rights between migrant and urban residents regarding basic public services. On the other hand, we should pay attention to the upbringing of left-behind children in rural areas and establish an effective care system for linking families, schools, and communities. The mechanisms of more robust causal relationships of both left-behind status and migration on children's behaviours and preferences require further testing.

Data availability

Data will be made available on request.

Acknowledgements

This work was supported by the National Natural Science Foundation of China (72073117;71773108).

Appendix A. Procedures of the field experiment

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chieco.2023.101982>.

References

- Abeler, J., Becker, A., & Falk, A. (2014). Representative evidence on lying costs. *Journal of Public Economics*, 113, 96–104.
- Afridi, F., Li, S. X., & Ren, Y. (2015). Social identity and inequality: The impact of China's Hukou system. *Journal of Public Economics*, 12, 17–29.
- Akerlof, G. A., & Kranton, R. E. (2000). Economics and identity. *Quarterly Journal of Economics*, 115(3), 715–753.
- Bai, Y., Zhang, L., Liu, C., Shi, Y., Mo, D., & Rozelle, S. (2017). Effect of parental migration on the academic performance of left behind children in North Western China. *Journal of Development Studies*, 54(7), 1154–1170.
- Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behaviour*, 10(1), 122–142.
- Bolton, G. E., & Zwick, R. (1995). Anonymity versus punishment in ultimatum bargaining. *Games and Economic Behaviour*, 10(1), 95–121.
- Buccioli, A., & Piovesan, M. (2011). Luck or cheating? A field experiment on honesty with children. *Journal of Economic Psychology*, 32(1), 73–78.
- Burks, S. V., Carpenter, J. P., & Verhoogen, E. (2003). Playing both roles in the trust game. *Journal of Economic Behavior & Organization*, 51(2), 195–216.
- Cadsby, C. B., Song, F., & Yang, X. (2019). Dishonesty among children: Rural/urban status and parental migration. In A. Buccioli, & N. Montinari (Eds.), *Dishonesty in Behavioural economics*. Elsevier.
- Cadsby, C. B., Song, F., & Yang, X. (2020). Are 'left-behind' children really left behind? A lab-in-field experiment concerning the impact of rural/urban status and parental migration on Children's other-regarding preferences. *Journal of Economic Behaviour and Organization*, 179, 715–728.
- Chang, H., Dong, X. Y., & MacPhail, F. (2011). Labor migration and time use patterns of the left-behind children and elderly in rural China. *World Development*, 39(12), 2199–2210.
- Charness, G., Gneezy, U., & Kuhn, M. A. (2012). Experimental methods: Between-subject and within-subject design. *Journal of Economic Behavior & Organization*, 81(1), 1–8.
- Chen, Y., & Feng, S. (2013). Access to public schools and the education of migrant children in China. *China Economic Review*, 26, 75–88.

- Crosno, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature*, 47, 448–474.
- Dong, Z., & Zhao, J. (2019). 'Left-behind' experience and competition preference of children: A field experimental study from central rural China. *Economic Perspectives*, 4, 33–48.
- Eckel, C. C., & Grossman, P. J. (1996). Altruism in anonymous dictator games. *Games and Economic Behavior*, 16(2), 181–191.
- Eckel, C. C., & Grossman, P. J. (2008). Men, women and risk aversion: Experimental evidence. In C. Plott, & V. Smith (Eds.), *Vol. 1. Handbook of experimental economics results* (pp. 1061–1073). New York: Elsevier.
- Espinosa, M. P., & Kovářík, J. (2015). Prosocial behaviour and gender. *Frontiers in Behavioural Neuroscience*, 9.
- Fan, F., Su, L., Gill, M. K., & Birmaher, B. (2010). Emotional and behavioural problems of Chinese left-behind children: A preliminary study. *Social Psychiatry and Psychiatric Epidemiology*, 45(6), 655–664.
- Fehr, E., & Gächter, S. (2000). Cooperation and punishment in public goods experiments. *American Economic Review*, 90(4), 980–994.
- Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *The Quarterly Journal of Economics*, 114(3), 817–868.
- Forsythe, R., Horowitz, J. L., Savin, N. E., & Martin, S. (1994). Fairness in simple bargaining experiments. *Games and Economic Behaviour*, 6(3), 347–369.
- Güth, W., Schmittberger, R., & Schwartz, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of Economic Behaviour and Organization*, 3(4), 367–388.
- Houser, D., Vetter, S., & Winter, J. (2012). Fairness and cheating. *European Economic Review*, 56(8), 1645–1655.
- Hu, H., Lu, S., & Huang, C. C. (2014). The psychological and behavioural outcomes of migrant and left-behind children in China. *Children and Youth Services Review*, 46, 1–10.
- Isaac, R. M., & Walker, J. M. (1988). Group size effects in public goods provision: The voluntary contributions mechanism. *The Quarterly Journal of Economics*, 103(1), 179–199.
- Johnson, N. D., & Mislin, A. A. (2011). Trust games: A meta-analysis. *Journal of Economic Psychology*, 32(5), 865–889.
- Kouider, E. B., Koglin, U., & Petermann, F. (2014). Emotional and behavioural problems in migrant children and adolescents in Europe: A systematic review. *European Child & Adolescent Psychiatry*, 23(6), 373–391.
- Lei, L., Liu, F., & Hill, E. (2017). Labour migration and health of left-behind children in China. *Journal of Development Studies*, 54(1), 93–110.
- Leibbrandt, A., Gneezy, U., & List, J. (2013). Rise and fall of competitiveness in individualistic and collectivistic societies. *Proceedings of the National Academy of Sciences*, 110(23), 9305–9308.
- List, J. A., Shaikh, A. M., & Xu, Y. (2019). Multiple hypothesis testing in experimental economics. *Experimental Economics*, 22(4), 773–793.
- Luo, J., Chen, Y., He, H., & Gao, G. (2019). Hukou identity and fairness in the ultimatum game. *Theory and Decision*, 87(3), 389–420.
- Luo, J., & Wang, X. (2020). Hukou identity and trust—Evidence from a framed field experiment in China. *China Economic Review*, 59(2), 1–32.
- National Bureau of Statistics of the People's Republic of China. (2019). *Monitoring Survey Report on Migrant Worker*.
- Portes, A., & Rivas, A. (2011). The adaptation of migrant children. *The Future of Children*, 219–246.
- Rogers, R. D., Owen, A. M., Middleton, H. C., Williams, E. J., Pickard, J. D., Sahakian, B. J., & Robbins, T. W. (1999). Choosing between small, likely rewards and large, unlikely rewards activates inferior and orbital prefrontal cortex. *Journal of Neuroscience*, 19(20), 9029–9038.
- Roth, A. E., Prasnikar, V., Okuno-Fujiwara, M., & Zamir, S. (1991). Bargaining and market behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: An experimental study. *American Economic Review*, 81(5), 1068–1095.
- Schwieren, C., & Sutter, M. (2008). Trust in cooperation or ability? An experimental study on gender differences. *Economics Letters*, 99(3), 494–497.
- Stevens, G. W., & Vollebergh, W. A. (2008). Mental health in migrant children. *Journal of Child Psychology and Psychiatry*, 49(3), 276–294.
- Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology*, 1(2), 149–178.
- Turner, J. C., Brown, R. J., & Tajfel, H. (1979). Social comparison and group interest in Ingroup Favouritism. *European Journal of Social Psychology*, 9(2), 187–204.
- Wexler, B. E. (2008). *Brain and culture: Neurobiology, ideology, and social change*. Mit Press.
- Zhao, C., Wang, F., Li, L., Zhou, X., & Hesketh, T. (2016). Persistent effects of parental migration on psychosocial wellbeing of left-behind children in two Chinese provinces: A cross-sectional survey. *Lancet*, 388.
- Zhou, Y., Chen, S., Chen, Y., & Volland, B. (2022). Does parental migration impede the development of the cooperative preferences in their left-behind children? Evidence from a large-scale field experiment in China. *China Economic Review*, 74, Article 101826.