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Household investment diversification amid Covid-19 pandemic: Evidence from Chinese investors

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\textbf{ABSTRACT}

This paper finds the degree of investor’s investment diversification is found to be positively correlated with confirmed cases in the city where they live. This relationship is a result of stricter quarantine policy adopted by cities hit with more severe Covid-19 outbreak, which has led to increased time for investors to trade stocks and seek advisory. In addition, the employment of investors in these cities is often negatively affected. Therefore, they tend to hold a relatively pessimistic view on expectations of future income, and thus be more cautious and risk-averse in terms of investment decisions.

1. Introduction

As of 22 May 2021, more than 160 million Covid-19 cases and 3.45 million deaths have been confirmed globally. This pandemic is still spreading rapidly around the world. Covid-19 has an unprecedented impact on the economy and finance (Baker et al., 2020a). Most indexes of economic uncertainty have reached the peak (Altig et al. 2020). Moreover, Covid-19 is a continuous reallocation shock (Barrero et al., 2020; Singh et al., 2021), it changes the way of commuting (Chinazzi et al., 2020) and has a profound impact on governments (Kizys et al., 2020), firms (Acharya and Steffen, 2020; Carletti et al., 2020; Ramelli and Wagner, 2020) and families (Baker et al., 2020b; Hanspal et al., 2020a, 2020b; O’Donoghue et al., 2020).

After the outbreak of Covid-19, scholars have discussed the impact of the pandemic on financial markets and investors’ behavior. The continuing outbreak has led to unparalleled number of news releases and viewpoint discussions, and the overwhelming panic caused by the news media has intensified the volatility of the stock market (Haroon and Rizvi, 2020). Even the previous outbreak of Spanish influenza do not hit the stock market as strongly as Covid-19 (Baker et al., 2020c). The pandemic also affect the expectation and behavior of investors (Hanspal et al., 2020a; Hanspal et al., 2020b). Giglio et al. (2021) find that after the stock market collapsed from February to March 2020, individual investors are more pessimistic about the short-term performance of the stock market and the economy, but their expectations for the long-term economy and stock market are unchanged. After the crush of stock market, investors also have divergent opinions about whether to hold stocks in their portfolios. Some investors begin to be more risk-averse, and the total investment decrease by 9.15% (Yue et al., 2020). Some investors begin to trade more frequently during the pandemic. They open more accounts and the average weekly trading frequency increase by 13.9% (Ortmann et al., 2020). In addition, male investors and young people aged 18-35 tend to buy stocks when stock prices fall (Priem, 2020).

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Table 1
Covid-19 and investment diversification: Main finding.

|               | (1) Investment diversification | (2) Investment diversification (Robust test) | (3) Changing independent variables | (4) Eliminate obs. unwilling to take any risk | (5) Experience within half a year | (6) Experience over half a year | (7) Changing the regression model | (8) Using data in 2019 | (9) Adding city-level variables |
|---------------|--------------------------------|---------------------------------------------|------------------------------------|----------------------------------------------|---------------------------------|---------------------------------|-------------------------------|-------------------|-----------------------------|
| **Confirmed** | **OLS**                        | **OLS**                                     | **OLS**                            | **OLS**                                      | **OLS**                         | **OLS**                         | **Ologit**                      | **OLS**            | **OLS**                     |
|               | 0.0155***                     | 0.0135***                                   | 0.2398***                          | 0.0139***                                    | 0.0572**                        | 0.0128***                       | 0.0397***                      | 0.0103            | 0.0140**                    |
|               | (0.0035)                      | (0.0034)                                    | (0.0097)                           | (0.0034)                                     | (0.0269)                        | (0.0034)                        | (0.0101)                       | (0.0080)           | (0.0065)                    |
| **Control variables** | NO                             | YES                                         | YES                                | YES                                          | YES                             | YES                             | YES                           | YES               | YES                         |
| **City variables** | NO                             | YES                                         | NO                                 | NO                                           | NO                             | NO                             | NO                            | NO                | YES                         |
| **Province dummy** | YES                            | YES                                         | YES                                | YES                                          | YES                             | YES                            | YES                           | YES               | YES                         |
| **Constant**  | 1.7523***                     | 1.8001***                                   | 1.7383***                          | 1.7803***                                    | 0.5920                          | 1.8343***                       | -                             | 1.3525***         | 1.7821***                   |
|               | (0.0287)                      | (0.0602)                                    | (0.0553)                           | (0.0602)                                     | (0.3995)                        | (0.0569)                        | -                             | (0.2203)           | (0.1115)                    |
| **N**         | 29,687                        | 29,687                                      | 29,687                             | 29,687                                       | 29,687                          | 29,687                         | 29,687                         | 29,119            | 29,081                      |
| **R^2**       | 0.0175                        | 0.0865                                      | 0.1066                             | 0.0827                                       | 0.1841                          | 0.0852                          | 0.0453                         | 0.0574             | 0.0859                      |

Notes: Robust standard error is reported in the paratheses. * denotes 10% significance level, ** denotes 5% significance level, and * denotes 1% significance level.
In this study, we want to explore what investors have learned from the Covid-19 pandemic. Kizys et al. (2020) find that the Covid-19 pandemic has reduced the herding behavior of investors in the international stock market. Whether Covid-19 promotes household portfolio efficiency is investigated. Classical portfolio theory points out that investment diversification can effectively reduce investment risk (Markowitz, 1952). No matter what the risk preference of investors is, the portfolio should be diversified (Campbell, 2006). However, investors are not completely rational, and they are limited by a lack of information, time, and cognitive ability. Therefore, the effective way to make a decision is to depend on experience (Simon, 1957). The ‘imprinting effect’ theory points out that some particular environmental or experiences have a significant and continuing impact on individual behavior. Individual behavior has an obvious ‘historical brand’ (Rajan et al., 2021). Cognition, experience, and knowledge formed by experience are important to influence variables when individuals make decisions. (Marquis, 2003; Marquis and Qiao, 2018; Zheng and Zhang, 2021). As the outbreak of Covid-19 has a serious impact on the financial market, individuals have improved cognition level and summed up the experience, which means that they may be able to build more effective portfolios.

Using the 2020 China individual investor behavior database, this paper investigates the impact of Covid-19 on the individual investment. It is found that the number of stocks held by investors increases with confirmed cases in the city where investors live, meaning their portfolios are more diversified. Due to the strict quarantine measures, individual investors have more time to stay home. They spend more time to trade stocks and receive information from investment advisors, so their portfolios are more diversified. In addition, investors become more pessimistic and cautious, because the rate of employment has decreased due to Covid-19. This phenomenon is another reason that leads to the high degree of diversification of individual investors’ portfolios. Moreover, it is discovered that the pandemic plays an important role in promoting the investment diversification of middle-aged and elderly groups, households with low investable assets, and investors with low job stability.

The main contributions of this paper are shown in the following two aspects. Firstly, this study helps to explain the impact of Covid-19 on individual investor’s investment behavior. Many studies have discussed the impact of Covid-19 on financial markets and participants’ investment behavior, but there are few studies that investigate the impact of the pandemic from the perspective of investment diversification of individual investors. This study enriches the relevant literature and provides a new perspective to better understand the behavior of individual investors. Secondly, China’s capital market is at the key stage of deepening reform, and the structural contradiction between financial supply and demand is still prominent. Investors with high wealth and stable sources of income have benefited from the continuous development and improvement of China’s securities market. They have access to all kinds of financial products, and their family wealth increases steadily. This study finds that the pandemic has a greater role in promoting the diversification of investment for middle-aged and elderly groups, families with low investable assets, and investors with low job stability. Therefore, more attention should be paid to these investors. Optimizing the allocation of financial assets of such ‘vulnerable groups’ families will enhance their risk resistance after encountering the impact of external events, which is of great significance to narrow the gap between the rich and the poor and build a more stable capital market.

2. Data

The data used in this paper are retrieved from the 2020 China individual investor behavior database, covering 30,209 individual investors who live in 315 different cities. 29,687 observations are obtained after processing the missing data. Taking Heo et al. (2021), Ortmann et al. (2020), Li et al. (2020) into consideration, the following performance equation Eq. (1) is estimated with the number of stocks held as the dependent variable:

$$\text{Diversification}_{ij} = \beta_0 + \beta_1 \text{Confirmed}_{ij} + \beta_2 X_{ij} + \delta_i + \epsilon_{ij} \quad (1)$$

Where, Diversification$_{ij}$is measured by the number of stocks held by investors, Confirmed$_{ij}$is the log number of one plus confirmed cases in the cities where investors live. The vector $X$ represents a complete set of control variables that include age (AGE), gender (GENDER), marital status (MARRIED), education level that equivalent to university level or above (COLLEGE), occupation that is related with finance industry (PROFESSIONAL), whether self-evaluate as ‘familiar with financial knowledge’ (LITERACY), investment years (EXPERIENCE), family that owns real estate (ESTATE), and family owns investable assets worth over RMB three million (WEALTH). $\delta_i$ presents provinces dummy. See Appendix 1 for more details.

3. Empirical Results

3.1. Main findings

Firstly, this study examines the impact of Covid-19 on individual investment diversification. Column 1 of Table 1 shows the results in which control variables are not added to the regression. Columns 2 demonstrates the results in which control variables are gradually added to the regression. It is found that in each column, the coefficients of the variables, Confirmed, are 0.0155 and 0.0135, respectively and they are statistically significant at the level of 1%. These results indicate that individual investors who live in cities with more confirmed cases of Covid-19 are more likely to diversify their portfolios.

These findings are consistent with the projection of Giglio et al. (2021), Heo et al., (2021) as well as Yue et al. (2020) that household are responding to the pandemic and taking active decisions to mitigate their potential losses. Particularly, our findings are in line with Ortmann et al. (2020) who find German investors increased their trading intensity during the pandemic. Unlike German investors tend to decrease their risk by deleveraging and short selling, Chinese investors mitigate their risk by diversifying their positions.
Several robustness tests, such as changing the independent variables, eliminating observations with zero risk appetite, distinguishing experienced and newbie investors, changing regression models, or adding city-level fixed variables are conducted. All the regressions report consistent, positive coefficient of Confirmed. We conclude that these results are consistent with benchmark regression that the Covid-19 pandemic is associated with positive investment by diversifying investors’ holdings.

3.2. Mechanisms

What drives household’s changes its investment style amid the pandemic? There are numerous theories that provide relevant discussions. A large body of literature attributes the changes to the household’s sudden change of risk tolerance, since the pandemic is a typical extreme event for all households (see for example, Baker et al., 2020b; Giglio et al., 2021; Yue et al., 2020). Another strand of literature referring the change of economic environment as the major contributor of the change, as Davis et al., (2021), Kizys et al. (2021) finds. In this paper, we focus on microeconomic theory that household’s particular behaviour as the direct mechanism driving the change of investment style.

3.2.1. Time spent on stock

After the outbreak of the Covid-19, China has taken strict quarantine measures. As a result, individual investors stay at home longer and spend more time in the stock market. They also have more time available to learn investment knowledge and communicate with investment advisers. Therefore, the degree of investment diversification is expected to rise significantly. Column (1) of Table 2 shows the relationship between the number of confirmed cases of Covid-19 and the time spent on stock. The coefficient of the time spent on stock is 0.0128, which is significant at the level of 1%, indicating the time spent on the stock increases with the number of confirmed cases. Column (2) shows the relationship between the increase of time spent on stock and the degree of investment diversification. The coefficient of the time spent on stock is 0.0412, which is significant at the level of 1%, indicating that as individual investors spend more time on stock, their portfolios become more diverse. Column (3) shows the relationship between the time spent on stock and the times of consulting investment advisors. The coefficient of time spent on stock is also significant and positive (0.2548). Column (4) represents the results from the regression that incorporates the confirmed cases variable and the time spent on the stock variable into formula (1). Both coefficients of confirmed cases variable and time spent on stock variable are significant and positive. Compared with the regression used in Column (1), the coefficient of Confirmed is lower. It is estimated that Covid-19 may affect individual investment diversification through increasing one’s time spent on stock.

3.2.2. Working status

The outbreak of the pandemic affect the work stability and expected income of investors, and consequently affect an individual’s investment diversification. This study creates the work impact variable and expected income variable through the questionnaire and uses estimate results with formula (1). Column (1) of Table 3 shows the impact of the pandemic on an individual’s job. The coefficient of the number of confirmed cases is significant and positive, indicating that the pandemic undermines one’s work stability. Column (2) shows the relationship between the work impact variable and investment diversification variable. The coefficient of work impact is 0.0878 which is significant at the level of 1%, indicating that investors tend to diversify their portfolios when their work stability decreases. Column (3) shows the relationship between the work impact and the expected income. The results show that the correlation between the work impact and the decline of expected income is positive. Column (4) represents the results from regression that incorporates the work impact variable, whose coefficient is found to be significantly positive, into regression formula (1). The coefficient of Confirmed is also significant and positive (0.0113), and the coefficient is much lower than the counterpart in column (1) of Table 1. These findings indicate that there is a link between the work impact and investment diversification of individual investors.

| Table 2 |
| Picking stocks and investment diversification. |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) |
| OLS | OLS | OLS | OLS |
| Time spent on stock | Investment diversification | Times of consulting investment advisors | Investment diversification |
| Confirmed | 0.0128*** | 0.0412*** | 0.2548*** | 0.030*** |
| (0.0025) | (0.0078) | (0.0047) | (0.0078) |
| Time spent on stock | 0.0412*** | 0.2548*** | 0.0403*** |
| (0.0078) | (0.0047) | (0.0078) |
| Control variables | Control | Control | Control |
| Constant | 0.3846*** | 1.8714*** | 0.2341*** |
| (0.0414) | (0.0562) | (0.0275) |
| N | 29,687 | 29,687 | 29,687 |
| R-squared | 0.187 | 0.0868 | 0.1281 |

**Notes:** Robust standard error is reported in the parentheses. * denotes 10% significance level, ** denotes 5% significance level, and * denotes 1% significance level.
3.3. Heterogeneity

Household’s investing style has prominent time-varying characteristics (Li et al., 2020). Relating theory indicates that such pattern can be captured by taking the age of household’s head, or the accumulated wealth as the proxy. We now further test if the pattern persists when the Covid-19 pandemic occurs. We consider three factors that could moderate our main findings: household head’s age, households with low investable assets, and investors with low job stability.

3.3.1. Age

In accordance with the rules of the World Health Organization (WHO), sampled investors are divided into two groups: one is young investors aged 16-45, the other is middle-aged and elderly investors aged over 45. The results in column (1) of Table 4 show that the coefficient of Confirmed and middle-aged and elderly groups is significant and positive (0.0091), meaning that the pandemic promotes the degree of investment diversification of middle-aged and elderly groups.

3.3.2. Household investable asset

Descriptive statistics show that about 20% (5,918 observations) of individual investors own more than 1 million CNY in household investable assets. This is in line with the classic “80/20 Rule” (the Pareto principle). Therefore, the sample is divided into two groups: (1) investors with more than 1 million CNY in household investable assets, and (2) investors with less than 1 million CNY in household investable assets. The results in column (2) of Table 4 show that the coefficients of Confirmed and investable assets of less than 1 million are significant and positive (0.0099). This indicates that the investors with lower household investable assets are more sensitive to the impact of pandemic and their portfolios are more diversified.

Table 3
Working status and investment diversification.

|                | (1)          | (2)                  | (3)          | (4)          |
|----------------|--------------|----------------------|--------------|--------------|
| OLS            | OLS          | OLS                  | OLS          |
| Work Impact    | Confirmed    | Investment diversification | Expected income | Investment diversification |
|                | 0.0251***    | (0.0061)             |              | 0.0113***    |
| Work impact    |              | 0.0878***            | 0.0182***    | 0.0876***    |
|                | (0.0038)     | (0.0025)             | (0.0038)     |
| Control variables | Control      | Control              | Control      |
| Constant       | 4.1642***    | 1.5101***            | 0.3666***    | 1.4354***    |
|                | (0.1059)     | (0.0567)             | (0.0396)     | (0.0607)     |
| N              | 29,687       | 29,687               | 29,687       | 29,687       |
| R-squared      | 0.1338       | 0.1068               | 0.0232       | 0.1072       |

Notes: Robust standard error is reported in parentheses. * denotes 10% significance level, ** denotes 5% significance level, and *** denotes 1% significance level.

Table 4
Covid-19 and investment diversification: Heterogeneity analysis.

|                | (1) Investment diversification | (2) Investment diversification | (3) Investment diversification |
|----------------|--------------------------------|--------------------------------|--------------------------------|
|                | OLS                            | OLS                            | OLS                            |
| Confirmed      | 0.0118***                      | 0.0022                         | 0.0102***                      |
|                | (0.0035)                       | (0.0053)                       | (0.0036)                       |
| Confirmed * Middle-aged and elderly groups | 0.0091**                        |                                |                                |
|                | (0.0037)                       |                                |                                |
| Middle-aged and elderly groups | -0.0404**                      |                                |                                |
|                | (0.0203)                       |                                |                                |
| Confirmed * Investable assets less than 1 million |                              | 0.0099**                       |
|                |                                |                                | (0.0048)                       |
| Investable assets less than 1 million |                                | -0.4121***                     |
|                |                                |                                | (0.0261)                       |
| Confirmed * Low occupational stability |                                |                                | 0.0099***                      |
|                |                                |                                |                                | (0.0036)                       |
| Low occupational stability |                                |                                | -0.0670***                     |
|                |                                |                                |                                | (0.0196)                       |
| Control variables | Control                      | Control                        | Control                        |
| Constant       | 1.3747***                      | 2.1903***                      | 1.8813***                      |
|                | (0.0333)                       | (0.0633)                       | (0.0612)                       |
| N              | 29,687                         | 29,687                         | 29,687                         |
| R²             | 0.0836                         | 0.1066                         | 0.0771                         |

Notes: Robust standard error is reported in parentheses. * denotes 10% significance level, ** denotes 5% significance level, and *** denotes 1% significance level.
3.3.3. Work stability

Next, the sample is separated into two groups on the basis of occupational stability. One is investors with relatively low occupational stability such as self-employed workers and freelancers, the other is investors with high occupational stability such as employers of government and public institutions, and employers of giant financial and non-financial companies. The results in column (3) of Table 4 show that the coefficient of Confirmed and low occupational stability is significantly positive (0.0099), indicating that investors with low occupational stability hold more diversified portfolios during the pandemic breakout.

4. Conclusion

Using data of Chinese individual investors, this paper explores the impact of Covid-19 on individual investment diversification. The results suggest that individual investors living in a city with more confirmed cases of Covid-19 hold greater number of stocks. This indicates that there is a significant line between individual investment diversification and confirmed causes of Covid-19. It is conjectured that this relationship may be explained by the time that investors spend on stock and their pessimistic expectations about future income. It is also found that the impacts of the Covid-19 pandemic, in terms of investment diversification, are much greater on middle-aged and elderly investors, and investors with low wealth and occupational stability.

Investors who are middle-aged and elderly, low-wealth, and occupationally unstable are more vulnerable when facing emergencies. Ensuring the benefits and well-being of these groups amid external shocks such that they do not fall into poverty is crucial to building a harmonious society and solving relative poverty after the eradication of absolute poverty. In the capital market, these investors are also in a relatively inferior position. To improve and optimize their asset allocation, it is required to focus on the following aspects. First, strengthening the public health service system to better prevent and mitigate disasters. Second, reforming the social insurance system to build a reliable commercial insurance market. Third, enhancing the propagation of financial knowledge to raise investors’ risk awareness of the financial markets. Fourth, deepening the reform of talent management system for industry professionals such as investment advisors to boost the service quality of institutional investors. Future research could be contemplated by incorporating household’s actual income into the research design, to further evaluate if our findings can be quantifiable with household’s exact income.

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Supplementary materials

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