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COVID-19 Age-Related Fatality and Mortgage Defaults in the U.K.

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ABSTRACT:

We use data on U.K. mortgages to establish a link between age and probability of default. The recent spike in the number of weekly deaths in Britain implies we could plausibly assume a 50% rise in mortality for those older than 55, under an extreme scenario. This assumption also implies an increase in the number of defaults by 33.1% for those older than 75, by 9.9% for those aged 56 to 75, and by 2.9% for all ages combined.

COVID-19 Age-Related Fatality and Mortgage Defaults in the U.K.

BY POUYAN MASHAYEKH AND PETR ZEMCIK

Abstract:

We use data on U.K. mortgages to establish a link between age and probability of default. The recent spike in the number of weekly deaths in Britain implies we could plausibly assume a 50% rise in mortality for those older than 55, under an extreme scenario. This assumption also implies an increase in the number of defaults by 33.1% for those older than 75, by 9.9% for those aged 56 to 75, and by 2.9% for all ages combined.

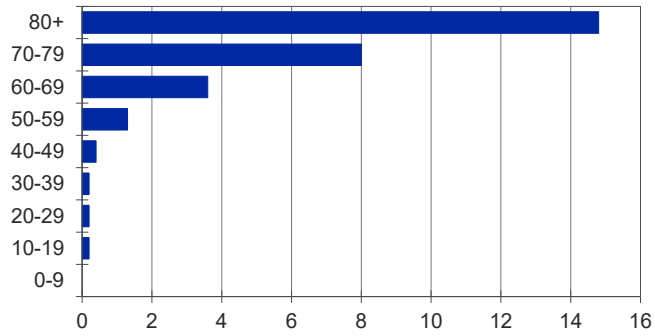
The COVID-19 pandemic has already had a profound impact on the U.K. The lockdown measures imposed on March 23 have ground large swaths of the economy nearly to a halt, putting the banking sector under ever-greater pressure as the unemployment rate spikes. One affected segment examined here is the U.K. mortgage market, namely how the fatality rates of age groups bear upon default rates.

We know that the fatality rate of COVID-19 increases with age and that the virus is more dangerous for the older population, all else equal. Although the mortality rate by age is not yet fully known for the U.K., we have this type of information from China and from Italy. The fatality rate for the 60-69 age group is 7.8%, while for the 70-79 age group it is 19.8% (see Chart 1). In this paper we quantify the impact of greater fatality for older age groups on the default rates of U.K. mortgages.

Although age is viewed as discriminatory in the mortgage application process, it does impact default rates even during normal times.[1] Older age is associated with a disproportionately higher mortality

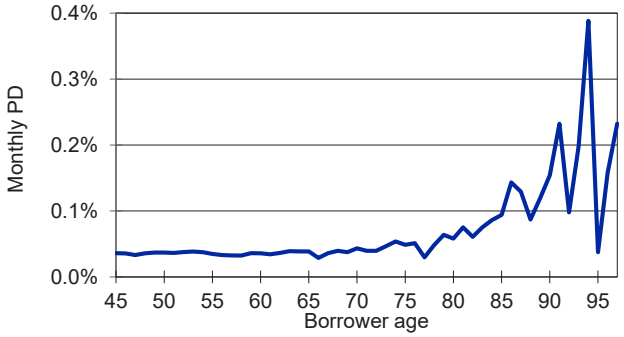
Chart 1: Death Rate by Age

Case fatality ratio, %



Sources: Chinese Center for Disease Control and Prevention, Moody's Analytics

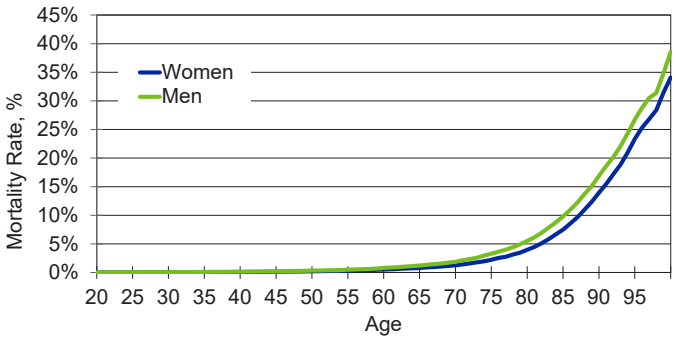
Chart 2: Mortgage PD Increases With Age



Sources: European Data Warehouse, Moody's Analytics

Chart 3: One-Year Mortality Rate in U.K.

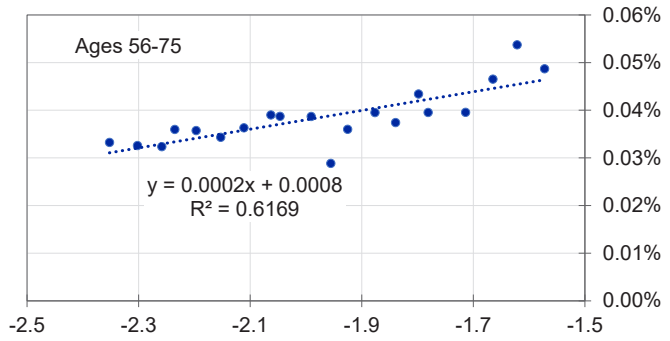
Mortality rate by age, %



Sources: Office for National Statistics, Moody's Analytics

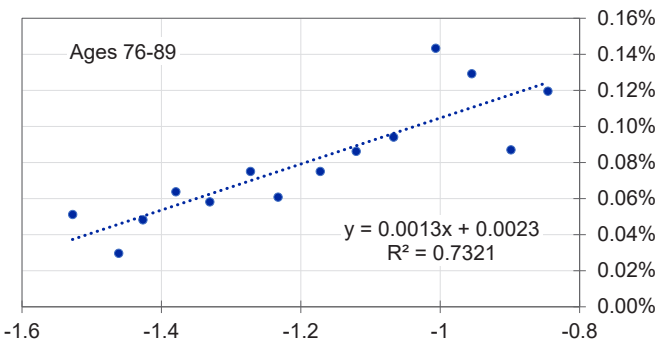
1 The U.K. Equality Act 2010 lists age as a sensitive characteristic, and the financial industry is mentioned as a potential source of discrimination. Also, a core principle of the Financial Conduct Authority is that customers are treated fairly.

Chart 4: PD as Function of Log (Mortality Rate)



Source: Moody's Analytics

Chart 5: PD as Function of Log (Mortality Rate)



Source: Moody's Analytics

rate for those infected with the coronavirus, and thus age will also affect mortgage portfolio default rates. To investigate the impact of age distribution on the probability of default, we analyzed a series of snapshots for U.K. mortgages from January 2013 to December 2019. First, we looked at the distribution of one-month PD versus age (see Chart 2). The default rate for a 90-year-old is three times that of a 70-year-old, so it would appear that PD is linked to age. Although the increase is not monotonic, PD is generally higher for older age groups.

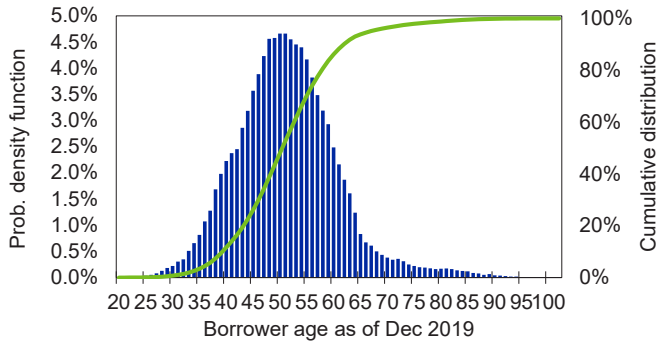
PD does seem to be linked to mortality, as both start increasing at the age of 55. The mortality rate is the probability that a person dies in the next year; we estimate it by dividing the number of deaths by population at each age in years in 2018. The mortality rate is 0.33% for women and 0.49% for men at the age of 55, 1.27% for women and 1.88% for men at the age of 70, and 13.94% for women and 16.87% for men at the age of 90 (see Chart 3). In our analysis, we combine the two genders to focus on the impact of age.

The mortality rate starts to rise more rapidly around age 56, with another inflection point around age 75. We have, therefore, analyzed the link between mortality rate and PD for ages 26-55, 56-75, and 76-89. The upper and lower age limits were imposed to eliminate outliers, although the age of borrowers stretches from 20 to 102. We have considered a simple linear regression between the log base 10 of the mortality rate and PD. Results for the two higher age groups show that the slope in the linear regression for below age 56 is slightly negative but very close to zero. It becomes positive for ages 56-75, and even more so for ages 76-89 (see Charts 4 and 5). The in-sample fit measured by R-squared also increases with age, as does the constant. This exercise illustrates the link between age and PD.

In addition to linking PD to the mortality rate, we also need the age distribution of borrowers and age at default distribution to quantify the impact on the portfolio-level PD. Our results reveal that 26% of borrowers are older than 56, while 3% of borrowers are older than 75 (see Chart 6). Similarly, 20% of defaulted borrowers are older than 56, while only 3% are borrowers older than 75 (see Chart 7).

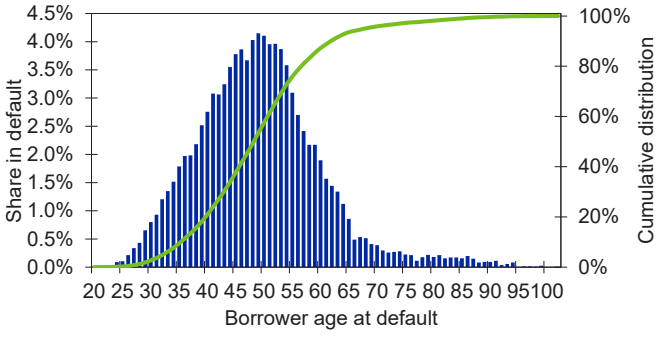
The Office for National Statistics reports that 616,014 people died in the U.K. in 2018 (see Chart 8). So far, we do not have the COVID-19 case fatality ratios in the U.K. which would correspond to the Chinese equivalents, as this requires looking at cohorts with confirmed infections. The U.K. government does publish the number of hospital deaths for patients with confirmed coronavirus infection, but this likely underestimates the actual num-

Chart 6: Mortgage Borrower Age Distribution



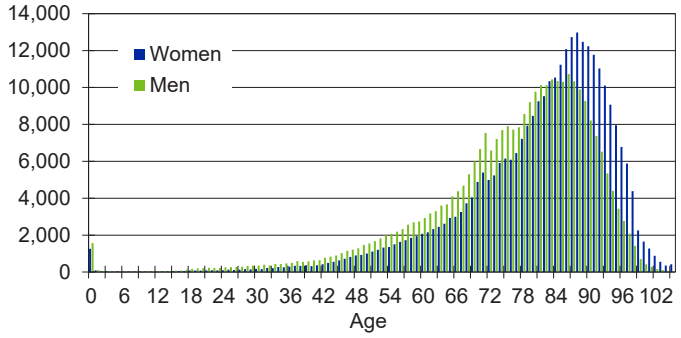
Sources: European Data Warehouse, Moody's Analytics

Chart 7: Borrower Age at Default



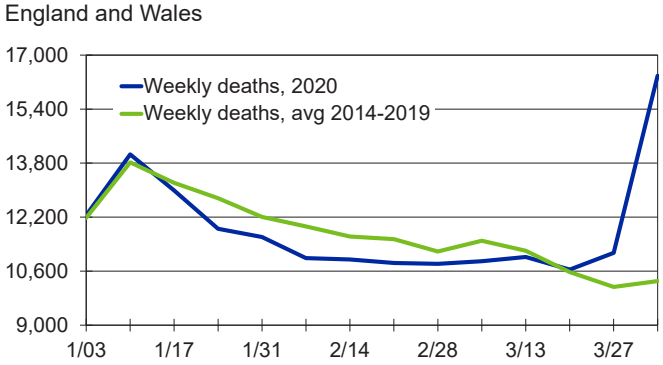
Sources: European Data Warehouse, Moody's Analytics

Chart 8: Number of Deaths in U.K. in 2018



Sources: Office for National Statistics, Moody's Analytics

Chart 9: Weekly Deaths Rise in April 2020



Sources: Office for National Statistics, Moody's Analytics

ber of deaths.[2] Therefore, the ONS publishes weekly numbers of total deaths, and this number increased sharply to 16,387 in the week ending April 3, 2020 (see Chart 9). This is 59% greater than the average number of deaths in the same period in 2014 to 2019. Of the deaths in the week ending April 3, 2,106 were due to underlying respiratory disease and 3,475 were deaths where COVID-19 was mentioned on the death certificate. Although it is unlikely that this trend will continue, as the U.K. has been on lockdown for several weeks, we do consider an average increase of 50% in the mortality rate to be plausible as an extreme, worst-case scenario.

Now that we have the link between mortality and PD, as well as the number of borrowers by age using data on U.K. mortgages from January 2013 to December 2019, we first compare the number of actual defaults with the number of predicted defaults using three regressions (see Table 1). As most coronavirus-related deaths occur in the older population, we assume that mortality increases by 50% for ages 56 and older. Given the recent rise in total deaths, this is a realistic assumption for an extreme scenario, although the number of weekly deaths is likely to decline because of the U.K. lockdown.

Our results indicate that the number of defaults increases by 9.9% for ages 56-75. The rise is even more dramatic for the 75-and-older group, with the number of defaults soaring to 33.1%. The overall increase in the number of defaults is 2.9%. Our results thus corroborate that the impact can be substantial, depending on how the pandemic evolves.

Table 1: Impact of Increased Mortality on the Number of Defaults for U.K. Mortgages

	Actual defaults	Predicted defaults	Predicted defaults with increased mortality	Increase
Below age 56	14,618	14,692	14,692	-
Ages 56-75	4,111	4,050	4,451	9.9%
Ages 76-89	442	443	589	33.1%
Total	19,171	19,185	19,732	2.9%

Sources: European Data Warehouse, Moody's Analytics

2 See https://www.gov.uk/guidance/coronavirus-covid-19-information-for-the-public.

About the Authors

Pouyan Mashayekh is a senior director of Consumer Credit Analytics at the Moody's Analytics New York office. Pouyan is experienced in credit risk modeling and has been involved in many custom projects for banks and financial institutions in the U.S., Canada and Europe. At Moody's Analytics, he heads the consumer credit modeling team in the Americas. Prior to joining Moody's, Pouyan worked for Countrywide mortgage bank in California. Pouyan has a PhD in economics from the University of Southern California.

Petr Zemcik is a senior director at the Moody's Analytics London office who manages a team of risk modelers and economists in the London and Prague offices. He frequently serves as an engagement lead and a head modeler for projects across several lines of business in the U.K., continental Europe, the Middle East and Africa to design and validate PD/LGD/EAD credit risk models for IFRS 9, A-IRB, and stress-testing. He supervises quality control, development, and validation of macroeconomic country models, credit risk products using proprietary data, satellite market risk models, and other forecasting products. He previously worked at CERGE-EI, a joint workplace of the Center for Economic Research and Graduate Education of Charles University in Prague and the Economics Institute of the Academy of Sciences of the Czech Republic, and at Southern Illinois University in Carbondale. Petr holds a PhD and MA in economics from the University of Pittsburgh and MSc in econometrics and operations research from the University of Economics in Prague.

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