

## Cash hoarding by German households – how much cash do they store and why?

*Since the introduction of euro cash in 2002, the Bundesbank has issued approximately €780 billion net worth of banknotes and coins. Thus, the cash in circulation issued in Germany has increased annually by an average of 8%. A considerable portion of this cash has migrated abroad to other European countries and to countries outside Europe by means of travel and the international wholesale banknote market. In addition to the use of cash as a means of payment, by far the largest share of cash in circulation in Germany is attributable to hoarding, i.e. the long-term storing of cash by households and firms.*

*The amount of cash held by individuals (i.e. not firms and credit institutions) outside their wallets was captured in a representative household survey. According to this study, individuals in Germany kept an average of €1,364 in cash at home or in a safe deposit box at a bank in 2018. Cash reserves were therefore significantly higher than the amounts of cash that individuals keep in their wallets for short periods of time for transaction purposes (roughly €107). The distribution of the amounts among the population was extremely uneven and highly concentrated. Older people, higher earners and self-employed people held the highest amounts of cash reserves on average.*

*Furthermore, the data were used to investigate whether cash reserves could be related to tax offences (e.g. not disclosing assets to the government). However, a regression analysis could not confirm this assumption. Instead, a lack of trust in the security and robustness of the technical infrastructure (e.g. fear of cyber attacks) appears to be a major factor in explaining cash reserves.*

## ■ Background

Since the introduction of euro cash in 2002, the Bundesbank has brought cash worth around €780 billion net into circulation. Official statistics on the use and retention of issued banknotes and coins are scarce since cash is anonymous. The Bundesbank therefore produces regular research reports, which analyse the cash in circulation in Germany and abroad using several different empirical methods. This article examines the cash reserves held by individuals in Germany in 2018.<sup>1</sup>

A central bank's net cash issuance can be used domestically as well as abroad. With regard to the domestic circulation of cash, a further distinction is made between the domestic transaction balances and domestic hoarding balances. The transaction balances comprise cash that is used at short notice to purchase goods and that is part of the constant cash cycle between the Bundesbank, commercial banks, retailers and consumers. By contrast, the hoarding balances serve as longer-term stores of value and are withdrawn from the constant cash cycle for the time being.<sup>2</sup>

Out of the €690 billion worth of banknotes issued in 2018, an estimated amount of just under €423 billion ended up in circulation abroad as a result of migration by means of the international wholesale banknote market and travel.<sup>3</sup> The Bundesbank estimates the domestic transaction balances to be approximately €58 billion, based on data from the payment behaviour study,<sup>4</sup> retailers' cash revenue and credit institutions' cash holdings. By contrast, estimating domestic hoarding proves difficult. Hoarding has thus far only been calculated indirectly by means of macroeconomic models and constitutes a residual. Previous estimates assume a volume of around €200 billion held by the private non-bank sector (households and firms).

This report examines cash reserves in the household sector using interviews followed by

a microeconometric analysis of the survey data. In recent years, the inexplicably high volume of domestic hoardings has also been linked to informal or illegal activities in public discourse, with calls being made for cash payments to be restricted or even for cash to be completely abolished.<sup>5</sup> This report addresses the following questions.

- How high is the amount of cash hoarded by German households? This comprises all cash holdings kept by households that are not directly used for transaction purposes.
- What role do age, education, region and economic and financial situation play?
- Are there indications of tax motives for storing cash (e.g. tax evasion or illicit work)?
- What legitimate reasons for storing cash are of significance (e.g. financial or technical security concerns)?

The survey entitled "Cash use in Germany" was conducted in 2018 to address the research questions. Roughly 2,000 participants provided information on cash reserves they store outside their wallets at home or in a safe deposit box at a bank. At the same time, the questionnaire was used to gather indications of individuals' honesty in tax matters. Owing to the highly sensitive topics, the main challenge was obtaining a representative sample with truthful answers. A wide range of confidence-building

Hoardings could  
serve illicit  
purposes

Research survey  
should provide  
more clarity

<sup>1</sup> This article is largely based on the forthcoming study "Bargeldverwendung in Deutschland – Eine empirische Analyse zu Ausmaß und Motiven der Aufbewahrung von Bargeld in deutschen Haushalten", which the Bundesbank conducted in collaboration with Professor Friedrich Schneider of the University of Linz. See Eschelbach and Schneider (2020).

<sup>2</sup> See Boeschoten (1992) and Bartzsch et al. (2011a, 2011b).

<sup>3</sup> These figures are based on an internal extrapolation of the estimates from the Monthly Report. See Deutsche Bundesbank (2018a). Coins are not included in this breakdown due to their low value (roughly €9 billion) compared with banknotes.

<sup>4</sup> See Deutsche Bundesbank (2018b).

<sup>5</sup> See Bofinger (2015), Rogoff (2016) and Sands (2016).

measures were taken to increase individuals' willingness to participate and respond.

The following first outlines the conception of the survey and how it was conducted. Subsequently, the average amount of privately hoarded cash in Germany is calculated using the personal data obtained from the survey. In addition, the distribution of the amounts among the population are analysed descriptively and broken down by socio-demographic factors. Finally, a regression analysis is used to examine whether there is a correlation between storing larger amounts of cash and a person's tax morale.

## **The "Cash use in Germany" study**

*Interview survey of 2,000 people*

2,000 people were interviewed for the "Cash use in Germany" study between January and April 2018. The key topics of the survey were the possession of cash (particularly euro cash) and people's tax morale. Detailed information was also collected regarding participants' socio-demographic background. The study participants were selected randomly using a random route method. The sample is representative of the German resident population.

*Sensitive questions: cash ownership and tax morale*

The sensitive topics were the key challenge of the study as the inclusion of such topics in voluntary surveys can result in low and selective participation, interview break-offs, non-responses and inaccurate answers. Questions about cash ownership relate to a person's financial situation, for instance. Participants may not provide information on existing cash reserves or may underestimate (underreport) them if they have concerns about the integrity of the survey. By contrast, questions regarding tax morale are based on socially undesirable or even illegal behaviour. Participants involved in such behaviour may not state the truth out of fear of potentially being prosecuted. If the sample contains selective non-responses and inaccurate answers, the evaluations are no

longer representative of the overall population and extrapolations are distorted.<sup>6</sup>

Numerous confidence-building measures were put in place to reduce the risk of participants answering selectively. Flyers provided information on the research aim of the survey. Participants were able to contact the study manager directly if they had any concerns. During the interviews, participants had the option of entering answers directly into the survey laptop without the interviewer seeing, or of submitting answers anonymously at a later date using a paper questionnaire. Furthermore, particularly sensitive topics were first introduced with more general questions before participants were asked about specific, personal circumstances.

*Confidence-building measures to increase willingness to take part*

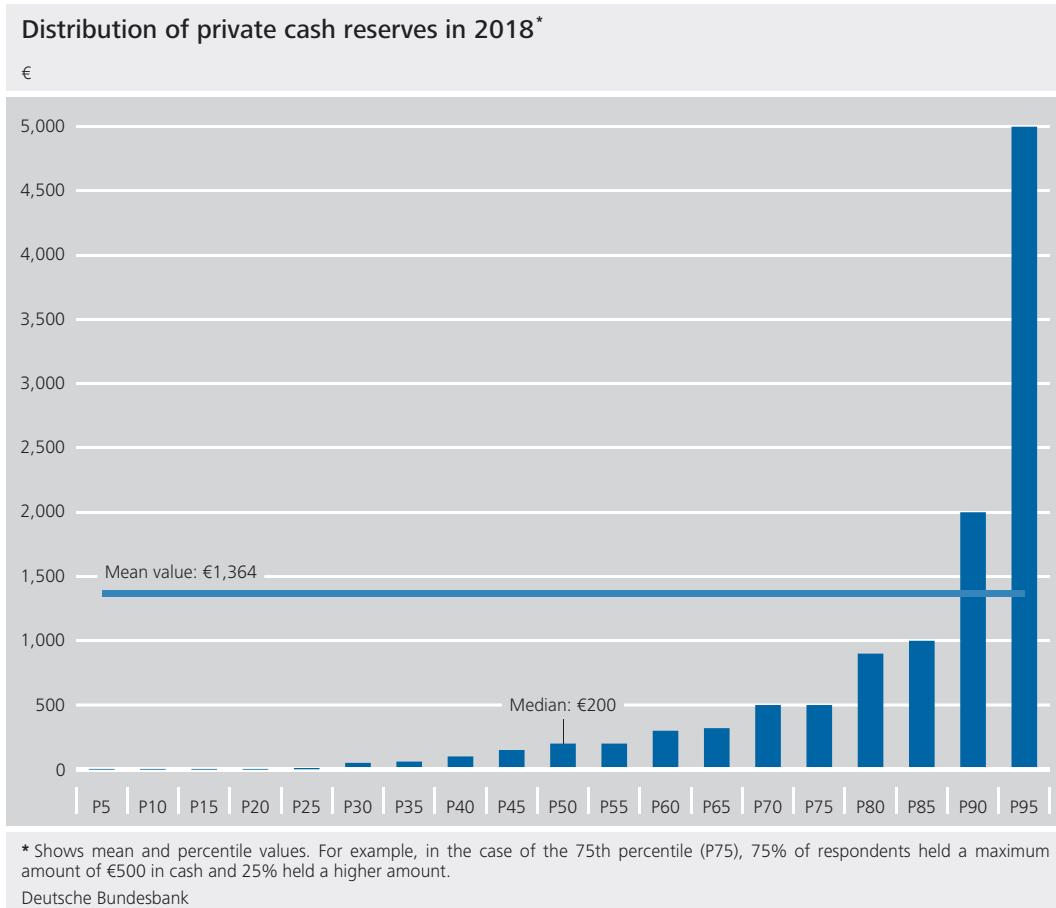
## **Distribution and extrapolation of cash reserves**

Analysis of the data shows that individuals in Germany stored an average of €1,364 in cash per capita outside their wallets in 2018.<sup>7</sup> The amounts were distributed very unevenly among the population. Many people held no cash reserves or only a small amount. By contrast, a small number of people kept very large sums of cash in reserve. The quantile distribution presented in the chart on p. 50 shows how often the various amounts were specified by respondents. 22% had no cash reserves. 50% held €200 or less (median). 75% held a maximum amount of €500. Amounts over €5,000 were only observed in 5% of cases (95th percentile). The highest figure reported was €100,000 (not shown in the chart).

*On average, individuals kept €1,364 in cash outside their wallets – with very uneven distribution*

<sup>6</sup> See, for example, Wooldridge (2010).

<sup>7</sup> The cash reserves held by individuals were determined using the following questions: "It's possible to keep cash in a piggy bank, a jam jar, under your mattress or in a safe at home, as well as in a safe deposit box at a regular bank or a savings bank. Taking into account all the above possible places where you may store your cash, if you add everything up: What is the total amount of cash you currently keep in reserve? Please note that this does not refer to cash kept in your wallet or on your person for daily needs".



The following three reasons can be cited to explain the uneven distribution: first, there are different preferences for cash and book money among the population. Second, the distribution of cash reserves is based on income and wealth distribution, which, taken in isolation, is already concentrated.<sup>8</sup> Third, there could be different reasons for storing the individual amounts of cash. For instance, larger sums are seen when cash is held long-term as a proportion of wealth. Smaller sums probably represent more of a consumption-related "stand-by" reserve, which will be used again for transaction purposes in the foreseeable future.

#### *Extrapolation*

The results of the 2,000 respondents are representative of the total German population over the age of 18. According to the Federal Statistical Office, this comprised roughly 69.254 million people at the time of the survey.<sup>9</sup> This results in a total of approximately €94 billion worth of cash reserves when extrapolated for the total population. In terms of the macroeco-

nomic estimates for domestic hoarding, roughly half of the stocks of hoarded cash in Germany (approximately €200 billion) would thus be located in households. However, when interpreting this value, account must be taken of under-reporting of amounts, which is typical in surveys and is to be expected here, despite the comprehensive confidence-building measures in place during the interviews. In addition to intentionally withholding information, individuals could also forget about certain amounts. In this case, the reported stocks of hoarded cash would be underestimated.<sup>10</sup>

<sup>8</sup> See Deutsche Bundesbank (2019a).

<sup>9</sup> As at 31 December 2017.

<sup>10</sup> Individual persons may also overestimate cash reserves if they report the cash reserves of their entire household in addition to any personal amounts. Nevertheless, this problem appears to be negligible in the data available. For more information, see Eschelbach and Schneider (2020).

## Socio-demographic distribution

The extremely uneven distribution of cash reserves among the population suggests that this may also be the result of socio-demographic differences. Specifically, the following variables are considered here:

- gender (male/female);
- age;
- region;
- education (no school leaving certificate/lower or intermediate secondary school leaving certificate/upper secondary school leaving certificate (*Abitur*));
- employment status (employed/unemployed/retired/homemaker/in education or training);
- professional status (wage earner/salaried employee/civil servant/self-employed or freelancer);
- net household income (in categories).

Mean values and selected percentiles were compared to determine group differences regarding the storing of cash (see the table on p. 52). Since this comparison is based on a sample of the total population ( $n = 2,000$ ), only statistically significant differences may be interpreted. In this table, the asterisks by the names of the socio-demographic variables indicate whether the differences are statistically significant.<sup>11</sup>

Cash reserves increase with age ...

Very marked differences in cash reserves are visible especially with regard to age. Older people store more cash on average. However, this relationship is not linear. The average cash reserves increase up to the age of 65. By contrast, from the age of 65 people store less cash again. High cash reserves shortly before the start of retirement can indicate the accumulation of a reserve for a person's retirement age, which is slowly reduced after the age of 65. The chart on p. 53 additionally presents the mean and percentile values of the individual age groups from the previous table in graphic form. This clearly demonstrates that age also

has an influence on the distribution of cash reserves: larger amounts are seen among older people, in particular.

Statistically significant heterogeneities are also apparent with regard to income. The average cash reserves rise with increasing income but their distribution also becomes broader: while there are fewer opportunities for low-income earners to store cash, cash reserves are broadly distributed among very high earners. The chart on p. 54 presents the income-specific mean and percentile values of the cash reserves from the table on p. 52 in graphic form. As seen in the case of age, the lower percentiles are barely influenced, i.e. the occurrence of comparatively low cash reserves is similar for people with higher and lower incomes. Conversely, high cash reserves are quite a reliable indication of a higher income.

... and with income

Furthermore, statistically significant differences are visible with regard to employment status. For example, individuals in education or training (school pupils, students, trainees) have very low cash reserves, which is consistent with the observations on age and income effects.

Differences also visible with regard to employment status ...

Among those in employment, self-employed persons have the largest reserves. It is striking that, in comparison to age and income, the status of self-employment significantly increases the amounts from as early on as the 75th percentile. Cash receipts from self-employed persons' own business transactions are the obvious explanation for this. Civil servants keep the smallest cash reserves. However, the low figures reported here could also be the result of more cautious responses given by civil servants, who have a reputation for being risk averse.<sup>12</sup>

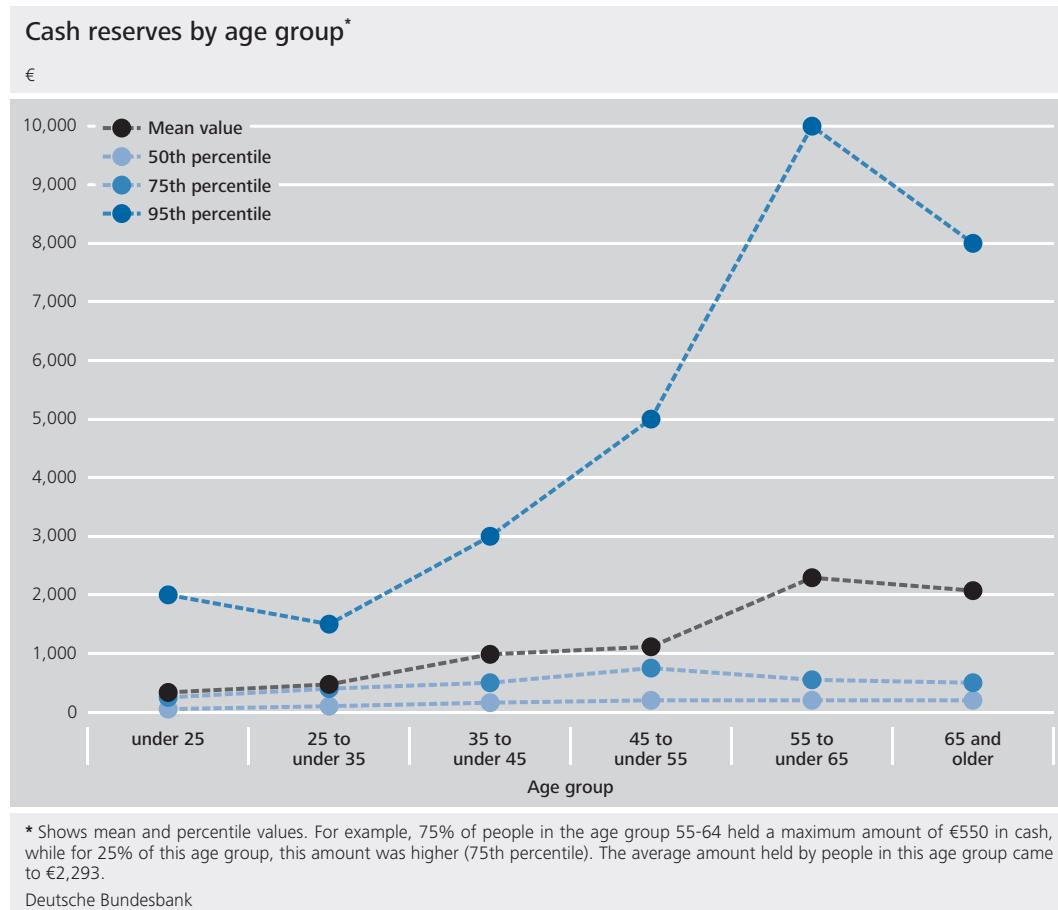
<sup>11</sup> To determine statistical significance, the cash reserves were regressed linearly on the respective socio-demographic group characteristic and heteroscedasticity-robust standard errors were calculated. This method was used in preference to a simple t-test as the variance of cash reserves can also differ across the individual groups (heteroscedasticity).

<sup>12</sup> See Buurman et al. (2012).

### Cash reserves of different socio-demographic groups<sup>o</sup>

Characteristic	Cash reserves (in €)				Share in the sample
	Mean value	50th percentile	75th percentile	95th percentile	
Gender					
Male	1,476	200	500	5,000	0.49
Female	1,256	200	500	5,000	0.51
Age***					
under 25	335	50	250	2,000	0.10
25 to under 35	472	100	400	1,500	0.16
35 to under 45	985	160	500	3,000	0.13
45 to under 55	1,114	200	750	5,000	0.18
55 to under 65	2,293	200	550	10,000	0.19
65 and older	2,072	200	500	8,000	0.24
Region					
Eastern Germany	2,281	150	700	7,000	0.20
Western Germany	1,130	200	500	5,000	0.80
Education					
Lower/intermediate secondary school leaving certificate	1,471	200	500	5,000	0.66
Upper secondary school leaving certificate ( <i>Abitur</i> )	1,181	100	500	5,000	0.31
No school leaving certificate/no information	737	120	500	5,000	0.02
Employment status***					
Employed	1,275	200	500	5,000	0.59
Unemployed	591	20	170	1,500	0.04
Retired	1,930	200	500	5,500	0.27
Homemaker	1,509	160	500	7,000	0.03
In education or training	234	50	200	1,500	0.06
Other/no information	723	200	500	5,000	0.01
Professional status***					
Wage earner	1,898	200	500	7,000	0.19
Salaried employee	1,043	200	500	5,000	0.64
Civil servant	543	50	250	3,000	0.05
Self-employed/freelancer	2,129	500	2,000	10,000	0.10
Other/no information	389	200	500	1,000	0.02
Nationality***					
German national	1,493	200	500	5,000	0.89
Foreign national	332	50	200	1,750	0.11
Net household income***					
€0 to below €1,000	627	50	250	2,000	0.07
€1,000 to below €1,500	968	150	400	3,000	0.11
€1,500 to below €2,000	980	100	500	5,000	0.12
€2,000 to below €2,500	1,730	200	800	5,000	0.12
€2,500 to below €3,000	1,690	300	1,000	5,000	0.13
€3,000 to below €4,000	1,571	200	500	7,000	0.15
€4,000 and above	2,635	200	1,000	20,000	0.12
No information	504	100	300	2,000	0.17
Household size					
Single-person household	1,097	150	500	5,000	0.20
Multi-person household	1,430	200	500	5,000	0.80

<sup>o</sup> The shares in the category "Professional status" refer to the group of people in employment. \*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% level in an F-test for joint statistical significance of the coefficients of a regression of the individual cash reserves on the respective group of characteristic indicators using heteroscedasticity-robust standard errors.



... and origin

Statistically significant differences in cash reserves can also be identified depending on nationality. On average, German study participants keep around €1,100 more cash in reserve than foreign participants. The fact that there are national differences in cash holdings is already known from the demand for cash for short-term transaction purposes.<sup>13</sup> For example, studies show that Germans also keep larger amounts of cash in their wallets by international standards.

reserves as a function of the risk and return of the individual forms of investment.<sup>14</sup> For the latter, cash demand models could be employed – such as those developed by Baumol and Tobin, in which cash reserves depend, in particular, on transaction costs, interest foregone, and planned consumption.<sup>15</sup> However, this study takes a current issues-based approach and, in line with current socio-political debate, primarily questions the extent to which cash reserves might be linked to the desire to keep income and assets private from the government.

## ■ Cash reserves and tax morale

Economic models for cash demand and current socio-political debate

The reasons people keep cash reserves can be many and varied. From an economic perspective, one of the first questions to emerge, for example, is whether the reserves are regarded as long-term assets or as medium to long-term liquidity reserves for future transactions. The former could be identified using portfolio theories on asset diversification, which model cash

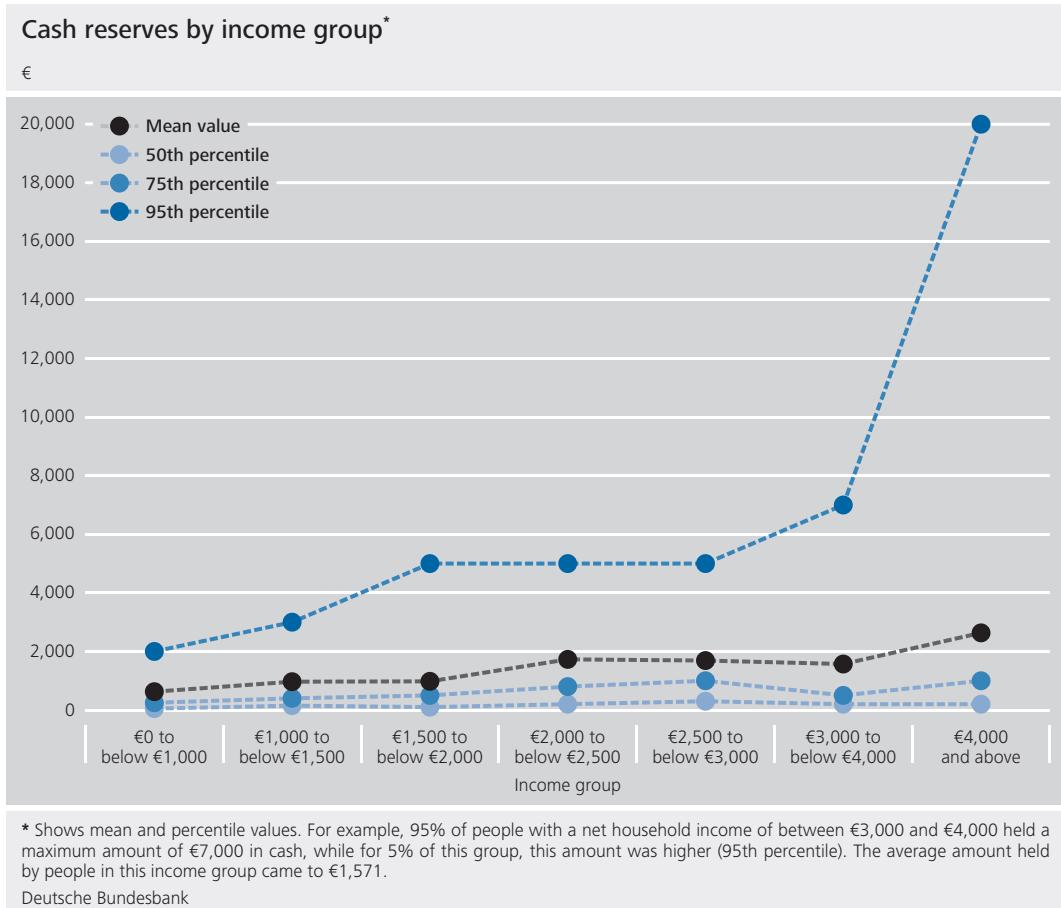
To this end, the study participants were asked a general question on the reasons for storing cash: "Why do you think that some people today choose to keep their savings in the form of cash? Please outline the three key reasons

88% of cash holders do not consider privacy a major motive

<sup>13</sup> See Kosse and Jansen (2013), Bagnall et al. (2016) and Esselink and Hernández (2017).

<sup>14</sup> See Markowitz (1952).

<sup>15</sup> See Baumol (1952) and Tobin (1956).



for this from your viewpoint". The respondents' answers are shown in the chart on p. 55. The evaluation focused on the responses of people who actually keep cash reserves themselves, since the objective is to draw conclusions about this group's own behaviour. Financial and practical considerations are revealed as the most important: "Savings at a bank yield little interest these days" (58%), "Cash is the most common means of payment" (55%), "Cash can be used even if technology fails" (41%) and "Cash does not involve fees" (31%) were the most frequent answers given. The protection of personal data through the anonymity of cash is nonetheless important to 23% of respondents. Protection against bank or government crises, which has probably been an issue for investors over the last few years, was cited less frequently by respondents in 2018 (19%). Tax motives only rank near the bottom of the list: 12% of people who keep cash reserves agree that an important reason for doing so is that "cash reserves are a good way of keeping your money

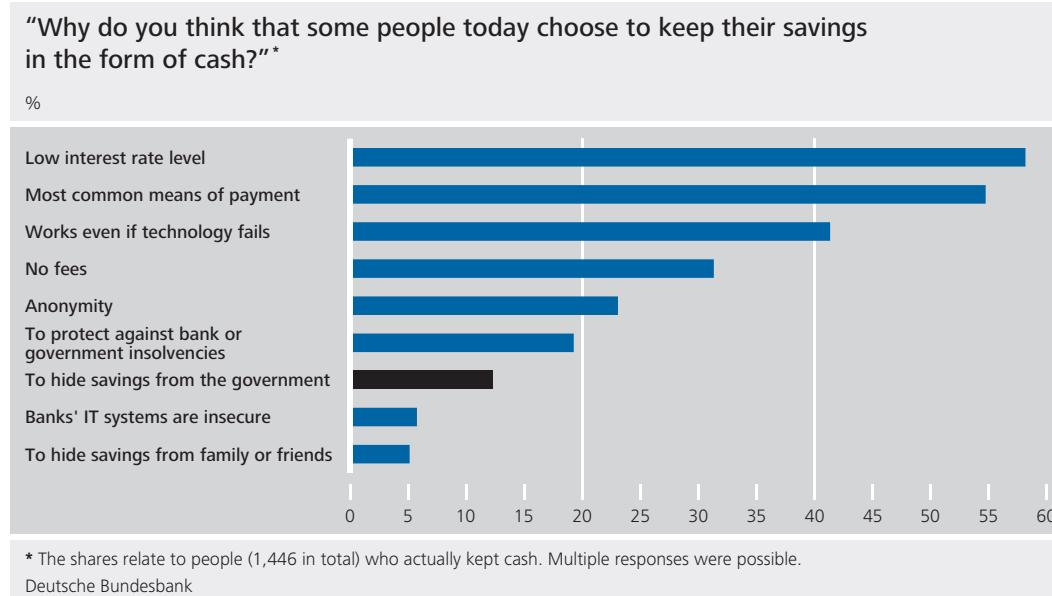
secret, and safe from the hands of government". Only potential security gaps in banks' IT systems (6%) and hiding savings from friends and relatives (5%) are less frequently cited as motives.

Assuming that cash holders initially answered these questions based on their own behaviour, an upper limit can be derived for the existence of tax motives among the general public. In this case, it would not be possible to rule out the existence of tax motives among 12% of cash holders. For 88% of this group, however, there would be no evidence of such motives.

A multivariate regression is used to further analyse whether tax considerations could play a role in cash reserves. The question at the heart of this analysis is: do people with poor tax morale have higher cash reserves on average?

In order to assess tax morale, study participants were asked whether the following statement

*Regression analysis to explain cash reserves*



17% of respondents rather unwilling to pay taxes

applied to them: "I'm perfectly happy to pay my taxes in Germany as I know that the government finances a lot of important things with this money". 17% of those surveyed disagreed somewhat or disagreed strongly with this statement. In the following, we assume that the tax morale of this group tends to be poorer.

No statistically significant correlation between cash reserves and tax morale

The table on p. 57 shows the results of a multi-variate least squares estimate in which a person's logarithmic cash reserves are regressed on the indicator for tax morale, various legitimate reasons for holding cash and different socio-demographic factors (e.g. age and income effects) (see the box on p. 56). The coefficient of the indicator for tax morale is not statistically significant.<sup>16</sup> Therefore, the regression does not indicate that tax evasion played a role in cash reserves.

In order to check the robustness of this result, three alternative indicators for assessing tax morale were derived from the questionnaire. In each case, a person was assumed to have relatively poor tax morale if they stated that, within the last ten years, they had worked off the books (4%), had considered working off the books (13%), or had personal acquaintances who worked off the books (18%). Even if these indicators are used in the regression, there is no significant correlation between a person's

tax morale and their cash reserves. For a detailed description of the results, see Eschelbach and Schneider (2020).

However, the table shows a very clear positive correlation between cash reserves and the variable "fear of cyber attacks". The cash reserves held by people who have doubts as to the security of banks' IT systems are 62% higher on average ( $[exp(0.4829)-1]*100\% = 62\%$ ). In the direct interviews, participants relatively rarely cited technical security concerns as a reason for keeping cash reserves (5%). However, if a person does keep cash reserves on account of such concerns, the amounts held appear to be relatively large. This could be related to the fact that people fear financial losses in the event of a cyber attack, which tends to result in smaller holdings of bank deposits and larger cash reserves.

Significant positive correlation between cash reserves and technical security concerns

The opposite situation applies where concerns about the reliability of electronic systems are involved ("fear of technical failure"). In the interviews, such fears were relatively often cited as the reason for cash reserves (41%), but demonstrate no impact in the regression of the amounts held. Since a technical failure in the

<sup>16</sup> This finding remains true even if insignificant variables are removed from the regression.

## Regression analysis of the reasons for keeping cash in Germany

Regression analysis can provide additional clues about the existence of tax motives for keeping cash. If cash reserves are motivated by tax considerations, persons with poor tax morale should, on average, keep more cash than persons with good tax morale. Such differences may, however, also be due to differing group compositions with regard to age, income and other explanatory factors. Multivariate regression analysis allows an estimation of a partial correlation between cash reserves and tax morale, adjusted for the effects of other explanatory variables. It is important to understand that only the effects of observed factors can be excluded. If there are unobserved differences between persons with good and poor tax morale that have an impact on hoarding behaviour, it will not be possible to tell anything about causality even with the help of a regression. The estimated values may therefore be interpreted merely as an attempt to approximate the actual impact (see, for example, Wooldridge 2010).

What is estimated is a linear model of the form

$$\ln(y + 1) = \alpha + \beta x + \gamma' W + \delta' Z + u.$$

The dependent variable  $y$  contains the amounts of cash hoarded by a single person. Owing to their skewed distribution (a small number of very high observation values in the right-hand tail), they are converted into logarithms for the regression. The key explanatory variable of the model,  $x$ , is an indicator variable for tax morale. It assumes the value of one if, according to the questionnaire response, the person tends to be rather unwilling to pay taxes.  $W$  is a vector with indicator variables for various legitimate reasons for holding cash reserves (data protection is important for the person, the person doubts the reliability of modern technology, the person doubts the security of banks' IT systems, the person is afraid of a new banking and sovereign debt crisis) and  $Z$  is a vector with numerous socio-demographic control variables (age, gender, level of education, household size, net household income, employment status,

self-employment, nationality, western/eastern Germany, assessment of financial situation).  $u$  stands as an error term for all the other determinants of cash hoarding not contained in the model. The model estimates  $\alpha$ , the constant, as well as  $\beta$ ,  $\gamma$ , and  $\delta$ , the slope parameters of the explanatory variables, using the ordinary least squares (OLS) method. The estimated value for  $\beta$  gives the partial correlation between tax morale and hoarding behaviour. The statistical inference of the estimation is based on heteroscedasticity and autocorrelation-robust standard errors.

In the interviews, around 17% of those surveyed disagree somewhat or disagree strongly with the statement "I'm perfectly happy to pay my taxes in Germany as I know that the government finances a lot of important things with this money". For this group, a poor tax morale was modelled in the regression ( $x = 1$ ). With regard to the possible legitimate reasons for holding cash reserves ( $W$ ), the interviews show that data protection is important for 42% of persons, 70% have doubts about the reliability of technological systems, 62% have doubts concerning the security of banks' IT systems, and 62% fear a new banking and sovereign debt crisis. The distribution of the socio-demographic control variables ( $Z$ ) may be seen in the last column of the table on p. 52.

In a regression, biases in explanatory variables may result in a failure to detect the correlations that actually exist between the variables in question. In the conducted regression, biases may, for example, occur in the case of the indicator variable for measuring tax morale if persons state, owing to pressure to give socially desirable responses, that they are perfectly happy to pay taxes, even though this is not the case. In order to prevent inaccurate answers as effectively as possible, participants were explicitly given the option of entering a concealed response themselves for this interview question.

payment process at a point of sale does not entail any financial losses, the cash reserves held based on this motive are likely to be relatively small.

Data protection considerations and worries about government or bank insolvencies play no role in the regression of the hoarded amounts. The majority of respondents also did not cite them as reasons in the interviews.

Furthermore, the regression results confirm the socio-demographic differences that have already been identified. The influence of age on cash reserves proves very stable in statistical terms. According to the regression, cash reserves increase by 1.5% with each additional year of age ( $[\exp(0.0145)-1] * 100\% = 1.5\%$ ). However, the regression does not reflect the descriptively observed decline in cash reserves in the highest age group.<sup>17</sup>

The regression also confirms the influence of financial resources on cash reserves. For instance, the cash reserves of individuals with a household income of between €2,500 and €3,000 are almost twice as high as those of individuals in the lowest income group ( $[\exp(0.6683)-1] * 100\% = 95\%$ ). The control variables for participants' subjective financial situation also show significant effects. The cash reserves of people who describe themselves as able to "make ends meet" without any problems are almost three times as high as those of people with financial difficulties ( $[\exp(1.075)-1] * 100\% = 194\%$ ).

## Conclusion

*Summary of the results*

According to the results of the interviews, in 2018, individuals in Germany kept an average of around €1,364 in cash at home or in a safe deposit box (besides the cash in their wallets).

<sup>17</sup> For the purposes of verification, an additional regression was carried out using five age group indicators instead of the constant age variables. These showed a steady increase in cash reserves up to the highest age group.

**Regression results explaining the amount of cash reserves<sup>o</sup>**

Explanatory variables	Dependent variable: Cash reserves (log.)	
	Coefficient	Standard error
<b>Reasons for holding cash</b>		
Reluctant to pay taxes	-0.1688	0.1758
Data protection important	-0.0517	0.1367
Fear of technical failure	0.0681	0.1468
Fear of a government or banking crisis	0.1846	0.1363
Fear of cyber attacks	0.4829***	0.1382
<b>Socio-demographic groups</b>		
Age	0.0145**	0.0061
Male	-0.0400	0.1350
Education		
Lower/intermediate secondary school leaving certificate	Ref.	Ref.
Upper secondary school leaving certificate (Abitur)	0.5945	0.4147
No school leaving certificate/no information	-0.0255	0.4270
Employment status		
Employed	Ref.	Ref.
Unemployed	-0.4491	0.3406
Retired	-0.1923	0.2351
Homemaker	0.1020	0.3684
In education or training	0.1470	0.2882
Other/no information	0.9183**	0.4104
Self-employed	1.0326***	0.3444
Net household income		
€0 to below €1,000	Ref.	Ref.
€1,000 to below €1,500	0.2928	0.2605
€1,500 to below €2,000	0.2521	0.2758
€2,000 to below €2,500	0.6781**	0.2994
€2,500 to below €3,000	0.6683**	0.3153
€3,000 to below €4,000	0.3202	0.3173
€4,000 and above	0.5487	0.3569
No information	-0.4935*	0.2985
Multi-person household	0.2340	0.1698
German	0.8042***	0.3074
Eastern Germany	0.2460	0.1592
Difficulties "making ends meet"		
Strongly agree	Ref.	Ref.
Somewhat agree	0.3559	0.2258
Somewhat disagree	0.9189***	0.2233
Strongly disagree	1.0752***	0.2259
No information	1.3928	0.8965
Constant	0.8715	0.5999
Number of observations	1,888	
R-squared	0.08	

<sup>o</sup> The table shows the estimated coefficients of a linear regression and their robustly estimated standard errors. \*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% level.

The distribution of the amounts was very uneven and highly concentrated. Older people and those with higher incomes tended to hold larger cash reserves.

12% of those who kept cash reserves felt that tax evasion could play a role in such reserves. However, a more detailed regression analysis cannot confirm this suspicion for the existing observations. Instead, the results of the study suggest that the German public primarily keep cash reserves for legitimate purposes. In particular, concerns about the security and reliability of technical systems appear to play a role in cash reserves.

*"Store of value"  
function of cash  
should not be  
underestimated*

Looking at the assets of the German population as a whole, cash plays a rather minor role. Households' total financial assets (cash, deposits, securities, other equity, mutual fund shares and claims on insurance corporations) amounted to €6,023 billion in 2018, with cash (hoarding and transaction balances) accounting for around 3.8% of this figure.<sup>18</sup> However, comparing the cash reserves according to the survey (€1,364 on average) with the amounts of cash that participants reported carrying in their wallets for transaction purposes (€107 on average),<sup>19</sup> it becomes clear that the general public see cash not only as a means of payment, but also to a large extent as a store of value.

*No specific  
indications of  
tax motives for  
cash storage*

The survey did not provide any specific indications of tax evasion as a motive for keeping cash reserves. Since respondents voluntarily provided information about the amount of their cash reserves and the data showed no correlation between the reserves kept and tax morale, it is reasonable to assume that the survey participants kept cash primarily for legitim-

ate reasons. As a result, this casts a critical light on suggestions that previously unexplained cash hoardings in Germany could be used to gauge the extent of tax evasion and criminal activity.

Compared with the regular studies on payment behaviour, this one-off, methodologically time-consuming survey on cash reserves merely provides a snapshot. However, because the payment behaviour studies indicate that fundamental behavioural patterns and attitudes toward cash change only slowly, regularly updating the results presented here would not bring a great deal of new information to light.<sup>20</sup> However, firms' cash holdings could be an important starting point for future research. This study allocated around half of the unexplained domestic hoarding stocks to the household sector. Nonetheless, it is not clear to what extent the study underestimated households' cash reserves despite confidence-building measures. An additional survey among firms about their longer-term cash reserves could shed more light on this issue.

Furthermore, future research in the household sector should focus on finding out more about the motives for private cash reserves as a whole. It would be useful to survey smaller groups of people by means of qualitative interviews focused on accurately pinpointing certain behavioural patterns and motives rather than quantitatively recording amounts of cash. The link to technical security concerns identified by the study could be used as a starting point for further research.

<sup>18</sup> See Deutsche Bundesbank (2019b).

<sup>19</sup> See Deutsche Bundesbank (2018b).

<sup>20</sup> See Deutsche Bundesbank (2012, 2014, 2015, 2018b).

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