

# Cash holding by consumers: The role of the perceived characteristics of money

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## Abstract

This study examined why consumers who typically pay electronically at points of sale still carry cash and explained the inertia of demand for cash by considering the additional (perceived by consumers) characteristics of cash. The research was motivated by the growing discussion on why cash, despite the increasing importance of e-payments, remains a significant part of the demand for money. The study focused on psychological factors and consumers' perceptions of certain features of cash, which make it an attractive additional option for precautionary reasons, and therefore, explored beyond the typical discussion of money as a means of payment. The structural equation modeling based on data collected as part of a survey of Polish consumers was used to verify the hypotheses. It was revealed that cash becomes a reserve solution for consumers, which is kept "just in case" to expand the scope of personal freedom and flexibility in making payments and protect against various potential restrictions and threats related to e-payments. Consumers' holding of cash as an additional option depends on three key factors: attitude toward cash, particularly the flexibility it offers, unusual purchasing situations, and perceived card or mobile payment risk, considered as a moderator. In the debate on the future of cash, the study supports the position that cash has a place in the modern payment system, although it plays a different role. Cash is a supportive backup solution. Eliminating cash significantly reduces consumer welfare.

## KEYWORDS

cashless economy, consumer behavior, consumer decision-making, consumer's attitude to cash, demand for money, perceived risk

## 1 | INTRODUCTION

Central bank statistics and several studies have consistently shown a notable rise in cash holdings in recent years (Ashworth & Goodhart, 2020; European Central Bank, 2021; Glowka et al., 2023; Rösl & Seitz, 2022). In most countries, cash in circulation increases faster than GDP and broad money supply. Therefore, this increase is more significant than expected under the typical conditions of a developing economy, where the number and value of transactions are increasing.

Moreover, cash remains a significant component of the total amount of money in circulation, even though the number of electronic

payments has been growing and the use of cash for transactional purposes has been declining (Alvarez & Argente, 2022; Jonker et al., 2022; Wisniewski et al., 2021). The majority of euro area citizens still pay with cash, even though they pay less cash over time, and generally prefer cashless means of payment (European Central Bank, 2021). An explanation for this paradox cannot be found in the traditional debate on payment method decisions (cash vs. electronic payments).

To date, research has focused on two main areas: the economic aspects of cash holdings, and the psychological and emotional attachment to cash. Studies on the economic aspects of cash holdings have

shown that cash is still used for transactions despite the growing popularity of digital payment methods, and that consumers continue to hold significant amounts of cash for non-transactional reasons: as a store of value and protection against financial crises (Ashworth & Goodhart, 2020; Rösl & Seitz, 2022).

In contrast, studies on the psychological and emotional attachment to cash have explored why some individuals feel attached to physical money. Such research has identified several factors that may contribute to feelings of attachment, including the tactile and sensory experience of handling cash, the sense of control and privacy associated with cash, and the cultural and social norms surrounding the use of physical money (Fenton-O'Creevy & Furnham, 2021; Kotkowski, 2023; Maison, 2019; Zhou et al., 2022).

This study explains the inertia of the demand for cash by considering the characteristics of cash perceived by consumers. It explores the behavior of consumers who usually choose electronic payments at a stationary point of sale (POS) but simultaneously hold cash. In a stationary POS, the two primary electronic payment channels are card and mobile payments.<sup>1</sup>

The research investigates a novel perspective on why consumers who typically pay electronically at stationary points of sale (cards or mobile) continue to carry cash. It argues that consumers want cash because they believe that it increases their freedom and security of flexible responses to threats when unforeseen events occur.

It is argued that if cash is maintained despite the decision to make electronic payments, the traditional cash/e-payment debate does not answer the question of why cash is still maintained. It was shown that another group of potential determinants should be investigated. It is assumed that consumers make numerous and often unpredictable payments and that they cannot be sure that a payment infrastructure will always be available. Therefore, they must decide to hold different types of money behind a veil of ignorance about the actual number and nature of transactions, and the actual availability of technical infrastructure at the time of payment. Therefore, they may additionally maintain a cash reserve due to the perceived risk of availability/failure of the technical infrastructure necessary to conduct electronic payments or the perceived uncertainty of events in the environment that may prevent electronic payments (e.g., war or a terrorist attack on technical infrastructure).

This study takes a fresh perspective to the debate on the choice between e-payments and cash as forms of payment. It was assumed that the decision to make e-payments, as a rule, has already been made by the consumer, and questioned why consumers nevertheless hold cash for reasons other than transactions. It was shown that cash becomes a reserve solution for consumers, which is kept "just in case" to expand the scope of personal freedom and flexibility in making payments and protect against various potential restrictions and threats related to the use of e-payments (as perceived by consumers). Therefore, a fraction of the demand for cash (even if not the highest value) exists for precautionary reasons.

A slightly extended and redefined concept of precautionary demand for money was used. Starting with Keynes (1936, 1937), the standard concept in the theory of money decomposes the demand for

money into transactional (resulting from the need to carry out transactions), speculative/portfolio (keeping money as a store of value), and precautionary (part of the demand for money that does not result from scheduled payments but from uncertainty). In many standard analyses of the demand for cash, precautionary demand is ignored and the discussion is reduced to the payment function of money. For more information on the evolution of the precautionary demand for money, see Cardim de Carvalho (2010). In this study precautionary demand was reinterpreted as part of the demand for money resulting from maintaining an additional cash balance for unpredictable cases (as perceived by consumers) when it is impossible to use the preferred form of payment. Consumers who usually pay electronically may also keep cash because they want a backup option in case of unforeseen problems with electronic payments. It was argued that certain characteristics of cash as perceived by consumers make it suitable for this role.

Thus, the objective of the study is not to provide arguments against the development of e-payment. Electronic payments play an important role in the current payment system and are likely to be key elements in the future. Their role in the economy, and thus in society, will grow. The research aims to contribute to the discussion on the place of cash in a society where electronic payments dominate.

The remainder of the article is organized as follows: Section 2 presents a literature review and establishes the variables used in the study. Section 3 elaborates the methods used. Section 4 presents the results. Section 5 discusses the results, while the final section presents the conclusions.

## 2 | LITERATURE REVIEW AND HYPOTHESES

Holding cash by consumers, who usually pay electronically, is a relatively new research area. Therefore, we must consider theoretical and empirical research from other related research areas as a starting point. When looking for potential determinants of keeping cash, we rely on several strands of literature regarding both the theory of money and consumer behavior. First, an extensive literature on the factors determining the reasons for choosing a particular payment channel (electronic vs. cash) is crucial. Although our research area is defined slightly differently, this is an interesting starting point. Another important strand of research is the macroeconomic theory of demand for cash, which considers, among others, the role of uncertainty and extraordinary situations (e.g., political and economic instability). The third area involves research on the perception of cash and the psychological aspects of its attachment. We also need to consider the research findings on the effects of the COVID-19 pandemic. This broad, multistranded literature review allows us to formulate the research model in the following sections.

In a recent review article, Shy (2023) showed the main research trends in the use of cash by consumers when choosing a payment method. He outlined several reasons why people opted to pay cash. First, cash payments are anonymous and do not generate records,

thus ensuring privacy. Second, they provide immediate final settlement without the need for third-party servers to clear the transaction. Third, cash payments can be made offline without relying on electricity or internet connectivity. Additionally, many consumers perceive cash as a low-cost payment option and find it easier to budget for their spending. Finally, social norms and personal habits influence people's cash payment preferences.

Numerous determinants of the choice between electronic and cash payments were considered. They include features of both payment methods: the relative costs of using cash and e-payments (Jonker, 2007; von Kalckreuth et al., 2014), the speed and convenience of payments (Arango et al., 2015; Brown et al., 2022; Polasik et al., 2013; van der Crujisen & Plooi, 2018), the safety of payments and the danger of theft or robbery (Kosse, 2013), the anonymity of payments (Garratt & van Oordt, 2021), and the availability and quality of the e-payment infrastructure at the POS (Bagnall et al., 2016; Snellman et al., 2001). Demographic characteristics were also assessed. The probability of using e-payments decreases with age and increases with education and income (Bounie et al., 2016; Carow & Staten, 1999). The literature also points to the importance of financial education (Fujiki, 2021; Świecka et al., 2021). Another group of determinants covers psychological and social factors such as payment habits (van der Crujisen & van der Horst, 2019). Liu et al. (2021) indicated that a particular payment method influences consumer behavior. However, not all these determinants are important from the perspective of our research questions. We studied electronically paid consumers. In principle, the consumer has already decided to make electronic payments and, therefore, has overcome any possible knowledge, skills, and mental barriers related to it; he also finds it economically appropriate. For example, it can be assumed that the speed and convenience of payments, and the relative costs of using cash and e-payments do not play a role in holding cash.

An important strand of discussion on the relative perception of payment channels concerns the perceived risk (Karoubi et al., 2016; Kosse, 2013; Park et al., 2019; Ramtiyal et al., 2022). However, the discussion of risk perception when making card or mobile payments has thus far been dominated by issues related to theft and robbery (Karoubi et al., 2016; Kosse, 2013). The broader spectrum of perceived risk has rarely been studied and only in the context of the choice of electronic payments (Karoubi et al., 2016; Liébanacabanillas et al., 2013; Oney et al., 2017). Karoubi et al. (2016) investigated the unavailability risk (difficulty in concluding a transaction in the absence of an instrument) and unacceptance risk (the seller does not accept the instrument or because the payment is unsuccessful for technical reasons) in the context of the choice of payment method. The results show that unavailability risk is a factor in determining the choice of payment method. Casado-Aranda et al. (2018) showed that perceived risky e-payments activate brain areas linked to negative emotional processing, whereas card e-payments elicit brain activations associated with negative and risky events.

The macroeconomic approach to cash demand is dominated by considerations related to GDP and interest rates. In particular, the role of interest rates and ultraloose monetary policy as key determinants

has already been discussed (Liñares-Zegarra & Willeson, 2021; Pietrucha, 2021). Low interest rates (through lowering the opportunity cost of holding cash) increase the value of the cash held by various economic agents by lowering the opportunity cost of holding cash. However, this explanation is incomplete, and does not fully explain the latest cash trends. From the consumer decision perspective, these issues constitute identical boundary conditions.

In addition, the importance of uncertainty, including that caused by political and economic instability, is increasingly being considered. Cash is held for precautionary reasons in the event of increased uncertainty and perceived threats to political and economic systems. This issue has been discussed, particularly in the literature on corporate cash holdings (Cheng et al., 2018; Jayakody et al., 2023). Macroeconomic research has also discussed this topic. It is emphasized that periods of increased instability are often associated with increased demand for cash, for example, in the USA after September 11 (Rösl & Seitz, 2022). Recent experiences related to the war in Ukraine confirm this effect; in February 2022, the demand for cash in Poland increased significantly (NBP, 2023). Economic instability had a similar effect. For example, the standard view of macroeconomics is that financial crises can lead to bank runs. Periods of financial system instability and banking panic increase the appeal of cash as a relatively safe reserve asset (Rösl & Seitz, 2022). Unfortunately, although the hypothesis of cash as a "safe haven" in a period of increasing uncertainty and precautionary holding cash seems very probable and, to some extent, obvious, it has only been confirmed in a limited way by empirical research dealing with consumers' decisions.

Another vital stream of research assumes that people perceive cash not only in terms of its main economic functions—means of payment and as a store of value. Extensive studies have demonstrated the symbolic and psychological importance of money (Anupam & Vinita, 2022; Belk & Wallendorf, 1990; Brandstätter & Brandstätter, 1996; Bruno & Faggini, 2022; Fenton-O'Creevy & Furnham, 2020, 2021; Furnham, 2014; Furnham & Murphy, 2019; Gasiorowska, 2019; Lea & Webley, 2014; Oleson, 2004; Purohit et al., 2022; Zaleskiewicz et al., 2017). A notable among the diverse research approaches is the proposal by Furnham et al. (2012), which has been continued in subsequent studies (Furnham et al., 2012; Furnham & Murphy, 2019). They identified four money-associated emotions: security, power, love, and freedom. In their interpretation, money is understood as an emotional lifejacket, a security blanket, and a method to stave off anxiety (security). Money buys escape orders and commands (freedom), and provides the capacity to purchase things that can be used to acquire importance, domination, and control (power). Additionally, money can be used as a substitute for emotional messages and affection (love).

The weakness of the above literature from the perspective of the purpose of our research is that it does not distinguish between different forms of money. These studies concern money in general (in various forms) and not cash alone. Therefore, it is impossible to draw direct conclusions regarding cash only. However, the above literature shows that the perceived characteristics of money matter for individual behavior, both in finance and the economy, and in other areas.

Only few studies have focused on cash. Consumers value cash highly for its perceived acceptance (Bagnall et al., 2016) and (as mentioned above) because it does not depend on technical infrastructure, online connections, or electricity supply. Kotkowski (2023) analyzed the relationship between national cultures according to Hofstede and recent trends in cash circulation. The results indicate that uncertainty avoidance explains the differences in the amount of cash in circulation among the studied countries.

However, a positive attitude toward cash may also have a broader context. Maison (2019) showed that some consumers have a positive attitude toward cash as they consider it the only real form of money, for example, when they cannot physically hold money, they feel as though they do not have any at all. They had negative emotions toward e-payments, calling them “false”, “fake”, “plastic”, and “dead.”

Maison (2019) has also developed the concept of “love for cash,” which is a positive and strong emotional attitude to cash consisting of a preference for concrete, physical money instead of virtual money. Love for cash comprises four dimensions:

1. Being in contact with physical money itself gives some people pleasure.
2. Cash gives a sense of security resulting from the conviction that they can pay anywhere with cash.
3. Cash gives a sense of control over finances and spending.
4. Cash gives them a sense of freedom and independence, leaving them the feeling that they are free to do as they please with cash without any constraints related to technology failures and barriers imposed by others.

The COVID-19 pandemic cannot be ignored while considering why consumers hold cash. The period of COVID-19 pandemic contributed to the further popularization of electronic payments, for sanitary reasons (Auer et al., 2020; Wisniewski et al., 2021) and a parallel increase in the supply of cash (Ashworth & Goodhart, 2020). There has been an increased use of money as a store of value, as evidenced by the increased demand for high-denomination banknotes (Chen et al., 2021; Guttman et al., 2021) and for precautionary reasons. Some analyses have considered hypotheses related to the increased role of uncertainty, panic-like activities, and demand for cash for precautionary reasons (Ashworth & Goodhart, 2020; Guttman et al., 2021).

An analysis of changes in the supply of cash in Poland during the pandemic was conducted by Kaźmierczak et al. (2022), concluding that a transactional motive did not cause the increase in demand for cash during the COVID-19 pandemic. Kotkowski and Manikowski (2023) explored the factors likely to induce Polish customers to pay cash instead of payment cards during the pandemic. Another study demonstrated the importance of uncertainty related to a pandemic (Pietrucha & Gulewicz, 2022).

Our study also borrows from the constantly developed theory of consumer behavior (Solomon, 2020; Szmigin & Piacentini, 2022), which emphasizes that consumer behavior depends not only on the perceived risk, but also on the purchasing situation; that is, all circumstances accompanying consumers' purchase of a good or service are not directly related to the perceived payment risk

(Belk, 1975; Hall, 1989; Maciejewski, 2012). We focus on atypical payment situations such as haste, high transaction value, first-time use of a card or telephone, or foreign purchases. To our knowledge, the role of atypical purchasing situations for electronic payments has not been studied in the literature so far.

However, the extensive, multistranded literature on using and holding cash does not fully explain the reasons for inertia in holding cash. In particular, the case of maintaining cash for consumers who make electronic payments has not yet been examined. In such cases, the traditionally indicated barriers (e.g., economic literacy) cannot provide a complete explanation. In principle, the consumers have already decided to make electronic payments and, therefore, overcome any possible knowledge, skill, and mental barriers related to it. They have therefore considered making electronic payments, considering the perception of ease of use and the related costs. However, they still maintain cash. The above research gap motivates our study.

Due to the new topic area, our study is mainly exploratory. We need to rely on previous research in similar areas, and on this basis, we formulate hypotheses regarding the holding of cash by people who pay electronically. In this study, we delve into the determinants of consumers' decisions to hold cash despite their preference for electronic payments. Our investigation focuses on the role of consumers' attitudes toward cash, perceived risk of card and mobile payments, and purchasing situation. Given the uncertainty about the impact of these factors on cash holding decisions, we explore both direct and indirect relationships. In the latter case, we propose that the purchasing situation and the perceived risk of electronic payments act as moderators, influencing the role of cash attitude. In essence, we hypothesize that the influence of cash attitude is contingent on payment circumstances and consumers' perceived risk of payment. We have formulated five hypotheses:

**H1.** Consumers' decisions to hold cash depend on their attitudes toward cash.

**H2.** Consumers' decisions to hold cash depend on the perceived risk of cards and mobile payments.

**H3.** The decision to hold cash by consumers depends on the purchasing situation.

**H4.** The perceived risk of card and mobile payments moderates the relationship between a consumer's attitude toward cash and the decision to keep cash.

**H5.** The purchasing situation moderates the relationship between a consumer's attitude toward cash and the decision to hold cash.

In Section 3.2, we describe the operationalization of the variables addressed in our hypotheses. We also provide a comprehensive overview of the empirical and analytical context for examining them, drawing on previous studies.

### 3 | METHODS

#### 3.1 | Survey and sample characteristics

We used an original dataset based on a standardized online survey conducted in 2021 by the Ariadna Nationwide Research Panel. The survey used a quota sampling method (quota in terms of gender and proportionality in terms of age and place of residence) based on Polish consumer characteristics, as reflected in the datasets of Statistics Poland and the Polish Statistics Office (GUS, 2021).

After formal verification of the research material, which consisted of rejecting incomplete or incorrectly completed questionnaires, 1, 100 observations were obtained. For the purpose of this research, we were only interested in consumers who used electronic payments. Therefore, we eliminated the responses of consumers who paid only cash from further analyses. The final sample size was 1, 040 participants. Table 1 shows the structure of the sample according to the following main demographic characteristics: gender, age, education, household size, and self-assessment of financial situation.

The sample consisting of only Polish consumers is a limitation of our research. If the payment habits of Poles were significantly different from those of other countries, the possibility of a broader interpretation of the results would be small. However, it is worth noting that the level of development of electronic payments in Poland is similar to the average of the European Union. The number of point-of-sale (POS) payment terminals per capita in Poland ranks 11th out of the 27 EU countries (the number of POS terminals per capita is slightly lower than the average). The same applies to the number of POS terminals per square kilometer (9th place and equal to the EU average). At the same time, however, the number of transactions per terminal in Poland is relatively high and much higher than the EU average. A similar conclusion applies to the number of payment cards: their number is lower than the EU average, but there are more transactions per card. Consequently, the number of transactions per capita is slightly above average. In addition, the rapid development and widespread use of non-card electronic payments should be considered (including Blik).<sup>2</sup> Payment innovations (such as contactless cards, mobile payments, and Blik) are relatively well accepted in Poland. Poland's cash to GDP ratio (12.9) is not much higher than the EU average (11.4).<sup>3</sup> Polish consumers, in general, are therefore neither leaders in the use of electronic payments (e.g., Swedish consumers) nor cash lovers, like Germans or the Swiss. Therefore, the behavior of Polish consumers may constitute a valuable reference point for research on decisions regarding the use of cash.

#### 3.2 | Description of the variables

Our study focuses on the determinants of decisions regarding cash reserve holding by consumers who typically make electronic payments. Therefore, the response variable is binary. This variable has two possible outcomes: "1" in the event of holding a cash reserve always or sometimes and "0" if cash is not held. This variable

**TABLE 1** Characteristics of the research sample ( $N = 1040$ ).

| Specification  | Frequency | Percentage |
|--|-----------|------------|
| <b>Gender</b>  |           |            |
| Female   | 549       | 52.8       |
| Male   | 491       | 47.2       |
| <b>Age</b>   |           |            |
| 18–24  | 124       | 11.9       |
| 25–39  | 306       | 29.4       |
| 40–59  | 352       | 33.8       |
| 60+  | 258       | 24.8       |
| <b>Place of residence by no. of inhabitants</b>                          |           |            |
| Rural area   | 385       | 37.0       |
| City up 50 k   | 254       | 24.4       |
| City from 50 to 200 k  | 177       | 17.0       |
| City over 200 k  | 224       | 21.5       |
| <b>Education</b>   |           |            |
| Primary/lower secondary  | 22        | 2.1        |
| Vocational   | 87        | 8.4        |
| Secondary  | 490       | 47.7       |
| Higher   | 441       | 42.4       |
| <b>Subjective assessment of the financial situation of own household</b> |           |            |
| Very bad   | 12        | 1.2        |
| Bad  | 38        | 3.7        |
| Rather bad   | 88        | 8.5        |
| Average  | 427       | 41.1       |
| Rather good  | 285       | 27.4       |
| Good   | 172       | 16.5       |
| Very good  | 18        | 1.7        |
| <b>Employment status</b>   |           |            |
| Employed   | 664       | 63.8       |
| Economically inactive or unemployed                                      | 376       | 36.2       |
| <b>Payment method for shopping</b>                                       |           |            |
| Only by card/phone   | 100       | 9.6        |
| Definitely more often by card/phone than in cash                         | 584       | 56.2       |
| As often by cash as by a card/phone                                      | 248       | 23.8       |
| Definitely more often by cash than by card/phone                         | 108       | 10.4       |

aggregates the responses to the question of whether, despite making electronic payments, the consumer also carries cash.

As mentioned above, considerations regarding why consumers keep cash even though they pay electronically are relatively new. Therefore, when creating our research model, we must consider the results, and thus potential variables, resulting from research in similar research areas; we cannot use an existing model.

In our model, the decisions to keep cash by consumers who make cards or mobile payments depend on the perception of certain specific characteristics of cash. We refer to this attitude as cash. We rely

on the aforementioned literature on the psychology of money. Our concept of attitude toward cash comes from the original concept of Maison (2019), but is newly interpreted because our task is to describe a decision-making situation that is slightly different from that of the original study. For example, Maison takes into account the “sense of control” variable: that is, “Cash gives a sense of control over finances and spending.” Some consumers believe it is easier to control their expenses if they pay cash. However, this issue relates to the transactional function of money, rather than its precautionary function. Hence, we partially modified Maison's approach.

From the first dimension of Maison's concept (that being in contact with physical money itself gives people pleasure per se), we created the variable CASH\_CULT. Thus, we separate the love of cash per se (regardless of the additional benefits it may bring) from the other dimensions. Holding cash may result from assigning it only as real money irrespective of any possible benefits. This concept is based on a known alternative between reality (the world perceived as actually existing) and the digital, virtual world, which some consumers may consider “less real.” Uhlmann and Zhu (2013) conducted experiments showing that when money lost its physical form, it is “not quite the same” money. To take into account this basic attitude toward cash in the study, we asked in our questionnaire for an opinion on the sentence “cash is the only real money” and created the variable CASH\_CULT.

Then, we designated four predefined concepts.

1. Security (ATC\_SEC): Cash is safer, especially in the context of cybersecurity, which is understood in terms of concerns about the loss of privacy and the unauthorized charging of bank accounts.
2. Freedom (ATC\_FREE): Holding cash provides a sense of personal freedom and flexibility in making payments under all conditions, consumers want to have banknotes in their wallets just in case. Freedom is understood here as expanding available options, which reduces the constraint in choice or action.
3. Fears (ATC\_FEAR): Preference for cash because of concerns about technology, banks, or the government.
4. Economic benefits (ATC\_ECON): Holding cash sometimes provides economic benefits such as the ability to buy something cheaper.

When constructing these variables, we used the selected answers to the questions from our questionnaire. For example, the variable (ATC\_SEC) is operationalized using consumer opinions regarding the following formulations: *I want to remain anonymous, and payment by card/phone leaves digital traces; I am concerned about the phishing of data that would allow unauthorized persons to access my account; I am concerned about unauthorized charging of my account as a result of contactless transactions.* We have included all necessary information, including used survey questions, in the Data S1.

Based on the theory of consumer behavior discussed in the previous section, we consider two further variables that, in our opinion, may influence consumers' decision to maintain cash reserves: the risk perceived by consumers related to card and mobile payments and atypical purchasing situations.

Consumers' perceived risk is not homogeneous. It consists of many different types of risk that appear together in most purchasing situations, creating a multi-element consumer risk structure. We believe that one type of risk perceived by consumers is that of not making electronic payments. We rely on the abovementioned literature on the perceived risk of electronic payments, including the ideas of unavailability risk and unacceptance risk (Karoubi et al., 2016). We created a PERC\_RISK variable (perceived risk associated with card and mobile payments) that aggregates the perceived risk related to the occurrence of events such as a technical break or failure of the terminal, no terminal at the point of sale, and no Internet connection. More information on the variables is provided in the Data S1.

Holding cash may also be associated with negative perceptions of making electronic payments in various atypical (from the consumer's point of view) shopping situations, including buying abroad or online, as well as other circumstances that increase the level of perceived threat/stress, such as a new card/telephone, a high product price, or a low level of trust in the seller or service provider. Unpredictable situations can cause additional stress (Loebnitz et al., 2015; Moschis, 2007; Park et al., 1989). We argue that this finding also has implications for cash holdings. An atypical shopping situation (and, therefore, increased uncertainty) may cause consumers to adopt a strategy of holding cash just in case. We deal with two groups of determinants: situational factors (such as rush and related stress, malaise, first-time purchase of a product, purchase abroad, and a low level of trust in the seller) and factors related to the purchased product (e.g., large one-off purchase volume and high costs of attaining the product). We believe that these factors can further impact consumers by increasing their cash needs and aggregating them into a buying situation variable (PURCH\_SIT).

We also use control variables that result from current research on the use of money and discussions on consumers' choices of payment channels—cash versus e-payment. First, we include age in the model, which is an important factor in determining cash holdings. We also considered other socioeconomic variables, such as gender, education, and perceived financial status.

Second, consistent with extensive literature (Fujiki, 2021; Świecka et al., 2021), we include financial literacy as a control variable. We redefined financial competencies in the context of payments and assumed that e-payment competencies increased with knowledge of various alternative electronic payment channels. Using the answers regarding the particular forms of payment used by the surveyed consumers, we constructed a variable for payment literacy (PAYM\_LITER).

We believe that this study controlled for the effects of the COVID-19 pandemic. The extensive literature identified in the literature review shows that the pandemic has had a significant impact on payment behavior. In the first phase of the pandemic, there were concerns regarding the transmission of the virus via banknotes. These fears were not confirmed, but from the perspective of many consumers, they could have left a negative attitude towards cash. This is justified because the empirical macroeconomic literature on earlier pandemics shows that the spread of infectious diseases lowers the

demand for physical cash after controlling for macroeconomic, financial, and technological factors (Cevik, 2020). To control for the effects of the pandemic, we introduce the variable UNHYG\_CASH, which illustrates consumers' fear of consumers toward banknotes being potentially unsanitary.

Other potential determinants of cash reserve maintenance may also be concerns related to political and economic instability and confidence in the government or banks. These issues are considered in macroeconomically oriented literature and less frequently in consumer research. However, we believe that the perception of threats related to political shocks (such as war and terrorist attacks) and economic shocks may be important for consumers' decisions. We rely on the literature on political and economic stability.

It should be noted that political instability is understood broadly in the literature—it is not only, for example, frequent changes in governments but also a sharp conflict turning into civil war, border conflicts, terrorist attacks, and open war. In the case of economic instability, we also discuss large-scale shocks (deep financial crises and threats to pension security) rather than typical changes in GDP within the economic cycle. Political or financial crises can increase the level of uncertainty felt by consumers and thus affect their cash holding decisions. This issue can be considered as a specific aspect of a broader issue. There is no more obvious statement in monetary theory than that money depends on trust, including trust in entities participating in the creation of money and the transfer of monetary units (central banks, governments, and banks). Money has value only if entities trust that it will be widely accepted in the future. Therefore, trust in a system consisting of rules, technological solutions, and participating and regulatory entities will not fail. This condition applies to both traditional and modern forms of money (Hull & Sattath, 2023).

We asked them for their opinions on these issues. These opinions formed the basis for creating variables concerning trust in the political and economic environments (TRUST\_PE\_ENV) and fear of political or economic instability (FEAR\_INSTAB). Detailed information on the operationalization of these variables is provided in the Data S1.

### 3.3 | Analytic strategy

The main aim of our study is to identify the variables that influence the decision to hold cash. For this purpose, we employed the partial least squares structural equation modeling (PLS-SEM) technique (Hair et al., 2021; Jöreskog & Wold, 1982), mainly because our model is rather complex and consists of 36 items for latent variables and several observed indicators. Using the more popular covariance-based (CB-) SEM requires matching large covariance matrices with more than 600 unique elements, an impossible task without extensive subjective fine-tuning measures. The problem of fitting a large model with the CB-SEM approach is further exacerbated by the large sample size ( $N = 1040$ ) that makes the model test statistics extremely sensitive to discrepancies between empirical and model-based covariances. Additionally, we have two-item constructs in the model that require

special treatment in the CB-SEM approach but are not a problem for the CB-SEM technique.

In the baseline version of the model, which aims to verifying hypotheses H1-H3, we use a single dummy endogenous variable related to cash holding decisions and a set of latent and observed exogenous regressors. We also consider models with interaction terms between ATC dimensions, perceived risk, and purchasing situations to test hypotheses H4 and H5. We used the procedure developed by Bodoff and Ho (2016) (see also Hair et al., 2019) to deal with single-indicator binary variables within the PLS-SEM framework. This is a two-step approach in which a standard PLS-SEM model is first fitted to identify latent constructs, and then a logistic regression model is estimated to measure the relationship between the identified constructs and the binary dependent variable.

For models with moderation, we use the product indicator approach (Sanchez, 2013, section 7.3). We considered a single latent interaction variable in each model. Including more than one interaction term leads to severe multicollinearity. Calculations were performed using the *plssem* package (Venturini & Mehmetoglu, 2019) in Stata 17.

## 4 | RESULTS

The results of our analysis were as follows: First, we examined the measurement part of the baseline version of the model. We then analyzed the structural logistic regression results of the baseline and moderated versions of the model.

### 4.1 | Measurement part of the baseline model

For the quality assessment of the measurement part of the model, we followed the recommendations provided by Hair et al. (2021, Chap. 4). Table 2 and Figure 1 show the indicator loadings of the multi-item constructs. Single-item constructs were excluded for brevity. Their loadings were always equal to one. All items exhibited satisfactory individual reliability, as the loadings exceeded the threshold of 0.708 (Hair et al., 2021, p. 77).

The quality of the measurement model was further examined for internal consistency, convergent validity, and discriminant validity of the multiitem constructs. Table 3 presents the results of the study. Three coefficients were used to measure internal consistency: the popular Cronbach's alpha, which is regarded as a conservative measure, and two more balanced alternatives proposed by Dillon and Goldstein (see Venturini & Mehmetoglu, 2019, p. 14) and Dijkstra and Henseler (2015). For all but the ATC\_ECON variables, even the conservative Cronbach's alpha was higher than 0.7, which is regarded as the acceptable level for that measure. The lower reliability of ATC\_ECON was also confirmed using the Dijkstra-Henseler measure. However, this value of 0.63 is acceptable for exploratory research purposes.

The constructs' convergent validity was evaluated using the average variance extracted (from) measure. The values range from 0.645 to 0.810 which are well above the threshold of 0.5.

**TABLE 2** Factor loadings for the measurement part of the model.

| Item  | PERC_RISK | PURCH_SIT | TRUST_PE_ENV | FEAR_INSTAB | ATC_SEC | ATC_ECON | ATC_FREE | ATC_FEAR |
|-------|-----------|-----------|--------------|-------------|---------|----------|----------|----------|
| PR1   | 0.826     |           |              |             |         |          |          |          |
| PR2   | 0.835     |           |              |             |         |          |          |          |
| PR3   | 0.792     |           |              |             |         |          |          |          |
| PR4   | 0.825     |           |              |             |         |          |          |          |
| PR5   | 0.886     |           |              |             |         |          |          |          |
| PR6   | 0.761     |           |              |             |         |          |          |          |
| PR7   | 0.838     |           |              |             |         |          |          |          |
| PR8   | 0.822     |           |              |             |         |          |          |          |
| PS1   |           | 0.844     |              |             |         |          |          |          |
| PS2   |           | 0.812     |              |             |         |          |          |          |
| PS3   |           | 0.815     |              |             |         |          |          |          |
| PS4   |           | 0.818     |              |             |         |          |          |          |
| PS5   |           | 0.856     |              |             |         |          |          |          |
| PS6   |           | 0.842     |              |             |         |          |          |          |
| PS7   |           | 0.744     |              |             |         |          |          |          |
| PS8   |           | 0.815     |              |             |         |          |          |          |
| PS9   |           | 0.720     |              |             |         |          |          |          |
| PS10  |           | 0.753     |              |             |         |          |          |          |
| TR1   |           |           | 0.911        |             |         |          |          |          |
| TR2   |           |           | 0.848        |             |         |          |          |          |
| TR4   |           |           | 0.818        |             |         |          |          |          |
| TR5   |           |           | 0.783        |             |         |          |          |          |
| TR7   |           |           | 0.746        |             |         |          |          |          |
| TR3   |           |           |              | 0.927       |         |          |          |          |
| TR6   |           |           |              | 0.830       |         |          |          |          |
| ATCS1 |           |           |              |             | 0.775   |          |          |          |
| ATCS2 |           |           |              |             | 0.865   |          |          |          |
| ATCS3 |           |           |              |             | 0.873   |          |          |          |
| ATCE1 |           |           |              |             |         | 0.838    |          |          |
| ATCE2 |           |           |              |             |         | 0.868    |          |          |
| ATCF1 |           |           |              |             |         |          | 0.913    |          |
| ATCF2 |           |           |              |             |         |          | 0.901    |          |
| ATCF3 |           |           |              |             |         |          | 0.885    |          |
| ATCR1 |           |           |              |             |         |          |          | 0.849    |
| ATCR2 |           |           |              |             |         |          |          | 0.904    |
| ATCR3 |           |           |              |             |         |          |          | 0.809    |

Note: The model accounts for several single-item observable constructs: AGE, PAYM\_LITER, CASH\_CULT, and UNHYG\_CASH.

For the discriminant capability evaluation of the model, we employed the heterotrait–monotrait ratio (HTMT) of correlations, which is favored over the more popular Fornell–Larcker criterion (Hair et al., 2021, pp. 78–79). Discriminant validity problems are present when the ratio is higher than 0.85 or 0.9 in the case of similar constructs. However, in our model, almost all ratios were much smaller. Only the two dimensions of ATC are characterized by a ratio slightly exceeding 0.85 (the HTMT for ATC\_ECON and ATC\_FEAR is equal to

0.867). However, they are definitely similar constructs, so a higher limit is not reached. The good discriminant capabilities of the model are also supported by the low VIFs calculated for the structural part of the baseline specification, as reported in the Data S1.

Finally, Table 4 reports the correlations among the constructs. They were moderate at most, as the highest value was 0.677. Consequently, we can safely use them jointly as regressors in the second step of the procedure without collinearity risk.

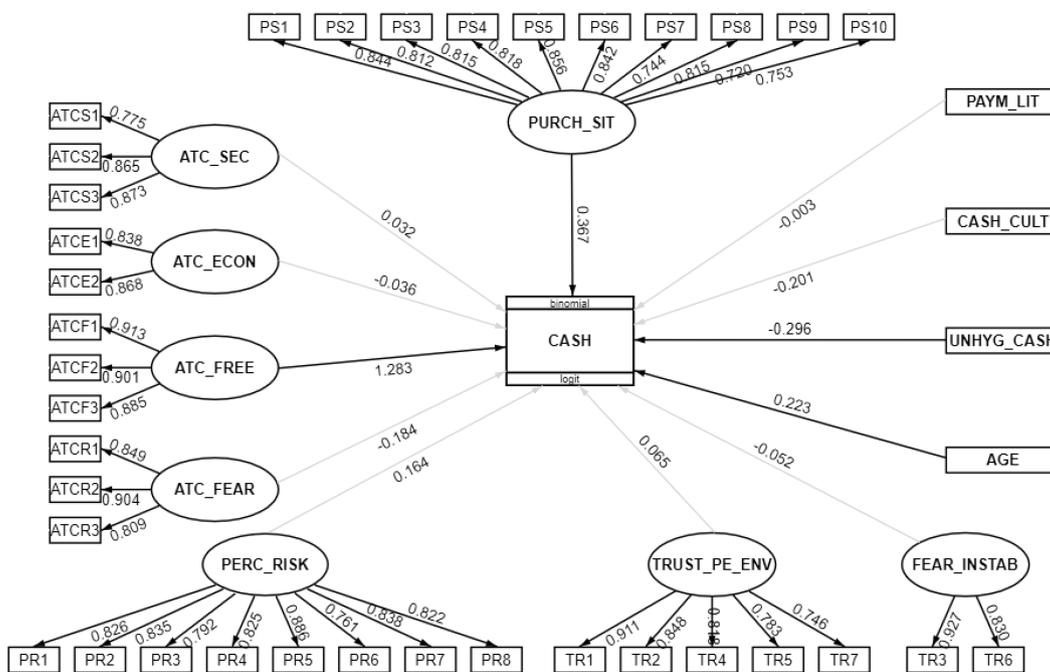


FIGURE 1 The path diagram for the baseline model. The grey arrows indicate insignificant relationships at 0.1 significance level.

TABLE 3 Measurement model quality assessment.

|                                  | PERC_RISK | PURCH_SIT | TRUST_PE_ENV | FEAR_INSTAB | ATC_SEC | ATC_ECON | ATC_FREE | ATC_FEAR |
|----------------------------------|-----------|-----------|--------------|-------------|---------|----------|----------|----------|
| Internal consistency reliability |           |           |              |             |         |          |          |          |
| Cronbach $\alpha$                | 0.933     | 0.939     | 0.882        | 0.718       | 0.789   | 0.627    | 0.883    | 0.816    |
| Dillon-Goldstein ( $\rho_c$ )    | 0.944     | 0.948     | 0.913        | 0.872       | 0.877   | 0.843    | 0.927    | 0.890    |
| Dijkstra-Henseler ( $\rho_a$ )   | 0.946     | 0.943     | 0.946        | 0.796       | 0.802   | 0.631    | 0.884    | 0.831    |
| Convergent validity              |           |           |              |             |         |          |          |          |
| AVE                              | 0.679     | 0.645     | 0.678        | 0.774       | 0.704   | 0.728    | 0.810    | 0.731    |
| Discriminant validity—HTMT       |           |           |              |             |         |          |          |          |
| PURCH_SIT                        | 0.722     |           |              |             |         |          |          |          |
| TRUST_PE_ENV                     | 0.170     | 0.224     |              |             |         |          |          |          |
| FEAR_INSTAB                      | -0.480    | -0.376    | -0.081       |             |         |          |          |          |
| ATC_SEC                          | 0.603     | 0.660     | 0.124        | -0.467      |         |          |          |          |
| ATC_ECON                         | 0.491     | 0.604     | 0.173        | -0.294      | 0.841   |          |          |          |
| ATC_FREE                         | 0.366     | 0.426     | 0.109        | -0.260      | 0.737   | 0.773    |          |          |
| ATC_FEAR                         | 0.476     | 0.586     | 0.155        | -0.408      | 0.825   | 0.867    | 0.622    |          |

### 4.2 | Structural models

In the second step of the analysis, we use logistic regression to measure the relationships between the constructs developed in the first step and cash holding decisions. The results are presented in Table 5 and Figure 1.

First, we considered the baseline model (M1) without the interaction terms. The most important motive for cash-holding is the freedom that the cash offers ( $\beta = 1.28$ ). Cash is also regarded as a protection against unexpected purchasing situations ( $\beta = 0.37$ ). Other significant factors were age ( $\beta = 0.22$ ) and hygienic considerations ( $\beta = -0.30$ ).

The results differed slightly when moderation was considered. We analyze the moderations between PERC\_RISK (M2–M5) and PURCH\_SIT (M6–M9) and cash holding decisions using cash attitude measures. We found that the perceived risk of electronic payments moderates the impact of the three ATC dimensions related to security, economies, and fears. The estimated interaction coefficient is also high for the fourth ATC dimension (freedom), although it is not statistically significant at the 10% level. However, no significant moderation effects are observed for the PURCH\_SIT variable. The slopes of the interacting ATC variables are shown in Figure 2.

TABLE 4 Correlation matrix for the constructs.

|              | PERC_RISK | PURCH_SIT | TRUST_PE_ENV | FEAR_INSTAB | ATC_SEC | ATC_ECON | ATC_FREE | ATC_FEAR | AGE    | PAYM_LIT | CASH_CULT | UNHYG_CASH |
|--------------|-----------|-----------|--------------|-------------|---------|----------|----------|----------|--------|----------|-----------|------------|
| PERC_RISK    | 1.000     |           |              |             |         |          |          |          |        |          |           |            |
| PURCH_SIT    | 0.677     | 1.000     |              |             |         |          |          |          |        |          |           |            |
| TRUST_PE_ENV | 0.171     | 0.218     | 1.000        |             |         |          |          |          |        |          |           |            |
| FEAR_INSTAB  | -0.393    | -0.301    | -0.072       | 1.000       |         |          |          |          |        |          |           |            |
| ATC_SEC      | 0.533     | 0.568     | 0.114        | -0.349      | 1.000   |          |          |          |        |          |           |            |
| ATC_ECON     | 0.382     | 0.463     | 0.140        | -0.195      | 0.588   | 1.000    |          |          |        |          |           |            |
| ATC_FREE     | 0.341     | 0.387     | 0.100        | -0.211      | 0.610   | 0.573    | 1.000    |          |        |          |           |            |
| ATC_FEAR     | 0.422     | 0.515     | 0.160        | -0.304      | 0.656   | 0.623    | 0.527    | 1.000    |        |          |           |            |
| AGE          | 0.063     | -0.033    | 0.117        | -0.030      | 0.049   | -0.071   | 0.008    | -0.011   | 1.000  |          |           |            |
| PAYM_LIT     | -0.054    | -0.112    | -0.089       | 0.049       | -0.169  | -0.208   | -0.196   | -0.241   | -0.165 | 1.000    |           |            |
| CASH_CULT    | 0.316     | 0.332     | 0.139        | -0.229      | 0.581   | 0.582    | 0.619    | 0.591    | -0.013 | -0.187   | 1.000     |            |
| UNHYG_CASH   | 0.125     | 0.108     | 0.085        | -0.143      | 0.034   | -0.056   | -0.150   | 0.000    | 0.184  | 0.129    | -0.183    | 1.000      |

In addition to age, other socioeconomic characteristics did not directly affect the outcome. However, in the Data S1, we present further results on their roles using a multi-group analysis. For most of the relationships studied, there were no significant differences between the groups. Notable exceptions are the stronger role of the security dimension of ATC for consumers with primary or vocational education, the higher impact of the ATC economic motive for men and village inhabitants, and the significantly higher coefficients for ATC freedom for men and employed respondents. Additionally, some differences between the groups were observed for the CASH\_CULT and UNHYG\_CASH variables. The former was more important for respondents with a poor financial situation, women, and inactive or unemployed respondents. The latter has a greater impact on the cash choice decisions of women, and inactive or unemployed respondents.

## 5 | DISCUSSION

Our results confirm the conclusions of previous studies regarding the importance of psychological factors in the decision to hold cash. The results confirm the importance of consumers' perceived cash characteristics (Maison, 2019) and perceived risks (Karoubi et al., 2016). Regardless, our results provide deeper insights into the factors significant for holding cash in a very specifically defined decision-making situation, that is, when electronic payments are the standard payment instrument. Therefore, the relative importance of individual factors reported in previous studies may differ from that observed in our study.

The results support H1 (with some reservations, depending on the examined dimension of attitude toward cash), H3, and H5 and reject H2 and H4. Our study suggests that the main determinant of cash holdings by consumers who typically make e-payments is the flexibility offered by cash. Maintaining cash as an additional option provides consumers with a sense of personal freedom. It provides flexibility in decision-making in various unpredictable situations. Holding cash increases the available options and thus the freedom to make decisions under uncertain conditions. Consumers often make unpredictable payments, and do not always know whether a given payment channel is available. Therefore, they must decide to hold different types of money behind the veil of ignorance regarding the conditions that exist during the transaction. Keeping cash expands the range of available options and improves the flexibility to make decisions. In this sense, keeping cash is precautionary as it is not held directly to make planned payments.

The remaining components of the attitude to cash in our study were statistically insignificant (if included in the model together). For example, the expectation of receiving additional economic benefits is not an incentive to hold cash in our study. At this point, it is worth paying attention to possible country-specific issues. In Poland, transactions very rarely impose additional fees for electronic payments or offer discounts for cash payments. There are usually no price differences (perceived by consumers) between making payments in cash or

TABLE 5 Estimated standardized coefficients of the structural part of the models.

| Variables    | Moderation models          |                            |                            |                            |                            |                            |                            |                            |                            |
|--------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|              | Baseline<br>M1             | M2                         | M3                         | M4                         | M5                         | M6                         | M7                         | M8                         | M9                         |
| PERC_RISK    | 0.164<br>(0.157)           | <b>0.575**</b><br>(0.252)  | <b>0.524**</b><br>(0.247)  | <b>0.508*</b><br>(0.263)   | <b>0.551**</b><br>(0.252)  | 0.163<br>(0.158)           | 0.171<br>(0.158)           | 0.160<br>(0.155)           | 0.175<br>(0.158)           |
| PURCH_SIT    | <b>0.367**</b><br>(0.163)  | <b>0.367**</b><br>(0.169)  | <b>0.398**</b><br>(0.172)  | <b>0.384**</b><br>(0.170)  | <b>0.397**</b><br>(0.173)  | <b>0.513*</b><br>(0.298)   | <b>0.471*</b><br>(0.274)   | 0.278<br>(0.301)           | <b>0.545*</b><br>(0.325)   |
| FEAR_INSTAB  | -0.052<br>(0.115)          | -0.016<br>(0.121)          | -0.058<br>(0.115)          | -0.053<br>(0.118)          | -0.061<br>(0.118)          | -0.042<br>(0.117)          | -0.053<br>(0.116)          | -0.053<br>(0.114)          | -0.054<br>(0.117)          |
| TRUST_PE_ENV | 0.065<br>(0.122)           | 0.091<br>(0.123)           | 0.072<br>(0.119)           | 0.068<br>(0.123)           | 0.069<br>(0.119)           | 0.079<br>(0.125)           | 0.072<br>(0.120)           | 0.062<br>(0.121)           | 0.074<br>(0.124)           |
| ATC_SEC      | 0.032<br>(0.163)           | 0.414<br>(0.257)           | 0.037<br>(0.166)           | 0.017<br>(0.170)           | 0.009<br>(0.169)           | 0.120<br>(0.213)           | 0.032<br>(0.164)           | 0.036<br>(0.164)           | 0.020<br>(0.168)           |
| ATC_ECON     | -0.036<br>(0.163)          | -0.031<br>(0.170)          | 0.544<br>(0.342)           | -0.013<br>(0.169)          | -0.027<br>(0.167)          | -0.035<br>(0.165)          | 0.089<br>(0.286)           | -0.038<br>(0.163)          | -0.041<br>(0.164)          |
| ATC_FREE     | <b>1.283***</b><br>(0.208) | <b>1.287***</b><br>(0.209) | <b>1.312***</b><br>(0.208) | <b>1.852***</b><br>(0.454) | <b>1.297***</b><br>(0.208) | <b>1.284***</b><br>(0.209) | <b>1.286***</b><br>(0.208) | <b>1.174***</b><br>(0.360) | <b>1.287***</b><br>(0.208) |
| ATC_FEAR     | -0.184<br>(0.205)          | -0.148<br>(0.205)          | -0.157<br>(0.205)          | -0.153<br>(0.204)          | 0.564<br>(0.405)           | -0.166<br>(0.204)          | -0.176<br>(0.204)          | -0.197<br>(0.201)          | 0.095<br>(0.425)           |
| PR*ATC_SEC   |                            | <b>-0.847**</b><br>(0.416) |                            |                            |                            |                            |                            |                            |                            |
| PR*ATC_ECON  |                            |                            | <b>-1.031*</b><br>(0.538)  |                            |                            |                            |                            |                            |                            |
| PR*ATC_FREE  |                            |                            |                            | -0.999<br>(0.653)          |                            |                            |                            |                            |                            |
| PR*ATC_FEAR  |                            |                            |                            |                            | <b>-1.190**</b><br>(0.589) |                            |                            |                            |                            |
| PS*ATC_SEC   |                            |                            |                            |                            |                            | -0.265<br>(0.400)          |                            |                            |                            |
| PS*ATC_ECON  |                            |                            |                            |                            |                            |                            | -0.265<br>(0.508)          |                            |                            |
| PS*ATC_FREE  |                            |                            |                            |                            |                            |                            |                            | 0.238<br>(0.617)           |                            |
| PS*ATC_FEAR  |                            |                            |                            |                            |                            |                            |                            |                            | -0.496<br>(0.722)          |

(Continues)

TABLE 5 (Continued)

| Variables             | Moderation models   |                      |                     |                     |                      |                      |                      |                     |                      |
|-----------------------|---------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|---------------------|----------------------|
|                       | Baseline M1         | M2                   | M3                  | M4                  | M5                   | M6                   | M7                   | M8                  | M9                   |
| PAYM_LITER            | -0.003<br>(0.111)   | -0.013<br>(0.112)    | 0.007<br>(0.115)    | 0.001<br>(0.113)    | 0.014<br>(0.114)     | -0.003<br>(0.111)    | -0.000<br>(0.112)    | -0.006<br>(0.111)   | 0.008<br>(0.114)     |
| CASH_CULT             | -0.201<br>(0.171)   | -0.194<br>(0.177)    | -0.204<br>(0.169)   | -0.206<br>(0.170)   | -0.203<br>(0.171)    | -0.199<br>(0.172)    | -0.201<br>(0.171)    | -0.201<br>(0.169)   | -0.197<br>(0.173)    |
| UNHYG_CASH            | -0.296**<br>(0.116) | -0.311***<br>(0.119) | -0.299**<br>(0.116) | -0.299**<br>(0.117) | -0.297***<br>(0.115) | -0.305***<br>(0.116) | -0.302***<br>(0.117) | -0.294**<br>(0.115) | -0.299***<br>(0.116) |
| AGE                   | 0.223**<br>(0.108)  | 0.204*<br>(0.108)    | 0.224**<br>(0.108)  | 0.230**<br>(0.108)  | 0.220**<br>(0.108)   | 0.215*<br>(0.110)    | 0.223**<br>(0.108)   | 0.224**<br>(0.108)  | 0.218**<br>(0.108)   |
| Pseudo R <sup>2</sup> | 0.219               | 0.225                | 0.225               | 0.223               | 0.226                | 0.220                | 0.219                | 0.219               | 0.220                |
| Observations          | 1040                | 1040                 | 1040                | 1040                | 1040                 | 1040                 | 1040                 | 1040                | 1040                 |

Note: Robust standard errors in parentheses: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

electronically. Such differences may only occur in the case of payments in the informal economy (e.g., charging or not charging VAT).

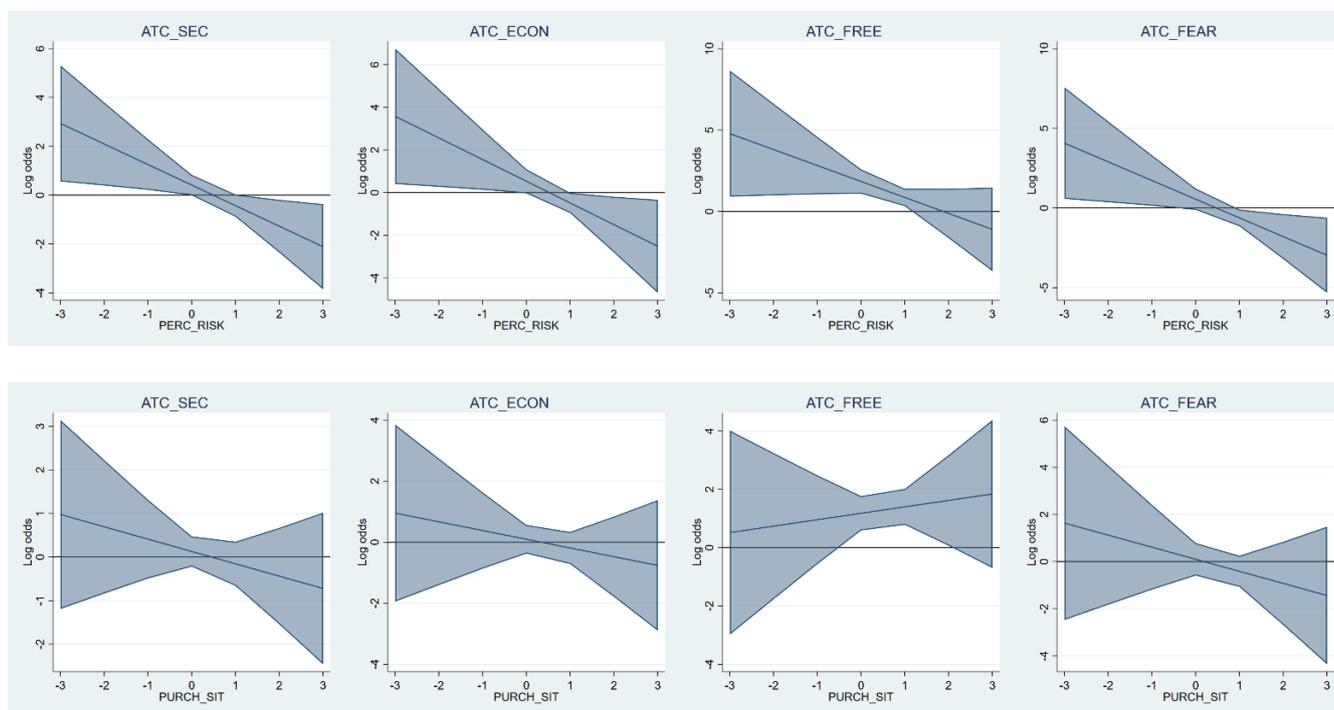
Two additional vital variables are atypical purchasing situations and the perceived risks of electronic payments. The former directly influences the cash-holding decision, whereas the latter moderates the impact of the ATC dimensions. Tensions associated with various atypical shopping situations cause consumers to prefer holding cash as an additional option. Having cash (in addition to a payment card/telephone) seems to reduce the stress associated with unusual and unpredictable shopping situations. Thus, we argue that consumers are more likely to hold cash in such situations. However, this conclusion should not be interpreted from the perspective of a trade-off between cash and electronic payments. We do not claim that cash is more likely to be used for payment in unusual shopping situations. However, we argue that consumers may want to hold cash under such circumstances as a precaution.

The importance of the remaining dimensions of attitude toward cash and the perceived risk of electronic payments are conditional. The perceived payment risk is a moderating variable. In particular, the likelihood of holding cash is significantly increased by security concerns and fears only for respondents who declare a relatively low level of perceived risk of electronic payments. The higher the perceived risk, the weaker the relationship among the perception of the benefits of having various alternative payment channels, concerns about cybersecurity, and the maintenance of cash reserves. In other words, when electronic payments are perceived as risky, the attitude of respondents toward cash matters less, even if they find cash not very attractive (low attitude toward cash), they may still hold to it.

All estimates show the effects of the COVID-19 pandemic. Viewing cash as unsanitary reduces the likelihood of holding cash reserves. We interpreted this variable as the effect of the pandemic because concerns related to it increased (regardless of the actual significance of the threat). Such consumer behavior has been commonly observed, especially during the first period of the pandemic. Moreover, the importance of this variable in maintaining cash reserves, although statistically significant, is not considerable.

It is also worth considering a group of variables that were not statistically significant in this study. The first is trust and fear of instability. In both cases results may come from the fact that the study was conducted in a period when public opinion placed relatively significant emphasis on the effects of the pandemic, and there were no large political and economic shocks at that time. The results of macroeconomic research indicate that this type of impact is significant only in the event of a large shock (Rösl & Seitz, 2022). There is, however, no evidence of a systematic effect of this type of uncertainty (Pietrucha, 2021). Our result is, therefore, consistent with previous research.

The results for payment literacy are not surprising. The literature on the choice of payment channel (cash vs. e-payment) indicates that economic/payment literacy is a key variable. However, it should be recalled that the purpose of our study was to examine a group of consumers who make electronic payments. Therefore, this group overcomes possible barriers to the knowledge and skills related to



**FIGURE 2** Slopes for the interacted ATC variables. Shaded areas represent 90% confidence intervals for the slopes.

electronic payments. Therefore, keeping cash by such a group of consumers is independent of knowing the e-payment channels.

The next variable in our study that is not important for holding cash by consumers who usually pay electronically is cash cult (being in contact with physical money gives some people pleasure). Therefore, the physical form of cash does not create a need to retain it among the surveyed consumers, regardless of the other perceived characteristics of cash. In other words, it does not hold because of its physical form but because of the other characteristics that we have examined. However, cash cult is susceptible to socioeconomic factors. For this reason, keeping cash increases significantly in the case of people with a relatively poor financial situation and those who are unemployed or outside the labor force (see Figure S1 in the Data S1). The importance of this variable (for holding cash) decreases in the case of better education and better financial situation.

Our study had some limitations. In particular, the fact that the survey was conducted during a pandemic should be considered as an increase in the use of e-payments was noted at that time. It is also challenging to assess the simultaneous perception of the danger of viral transmission through banknotes and the increased share of cash in circulation. In this study, we directly address the danger of virus transmission via banknotes (UNHYG\_CASH variable). In addition, the pandemic did not strengthen our results. The increase in the importance of electronic payments could weaken the positive assessment of cash and not improve it. We are aware that a pandemic is a period of heightened uncertainty. However, this effect was primarily observed during the first period of the pandemic. Therefore, we believe that conducting the study in 2021 will not significantly affect the results.

The second limitation may be the delimitation of the precautionary motive for holding cash from payments and speculative motives. The theoretical distinction between the two approaches is clear. Transaction motives result from planned payments under certain conditions. The precautionary motive concerns keeping cash just in case and is thus directly related to uncertainty. Under certain conditions, there was no reason to do anything just in case. However, in the survey, it was difficult to interpret consumers' motives as they may not have been perceived, thought out, or verbalized by them. We attempted to perform the study in such a way that, first, we did not research people who paid only cash. Therefore, we are certain that the results were not affected by the responses of people for whom cash was the only means of payment. Second, the structure of the question allowed the surveyed consumers to focus on cash held for the precautionary motive to a large extent and to limit inclusion in the response to holding due to speculative demand. However, this question does not change the overall conclusion of the study; that is, consumers keep cash despite the fact that they generally make electronic payments. This decision depends on the dimensions of the attitude toward cash, which include freedom and security as well as the atypical purchasing situation and perceived risk of electronic payments.

Our conclusions cannot be understood as arguments for the development of electronic payment. It should be repeated once again at this point that in our study, we did not consider the relative advantages and disadvantages of cash and electronic payments from the consumer's point of view. We evaluated why consumers sometimes keep cash even though they typically pay electronically. Therefore, we do not present any arguments regarding the development of electronic payments. However, in the debate on the future of cash, our

conclusions support the position (developed in the last few years) that cash has a place in the modern payment system, although it plays a different role than before. Cash is a supportive backup solution. Our research shows that consumers see the role of cash as a “just in case” solution to expand the scope of personal freedom and flexibility in making payments and to protect against various potential restrictions and threats related to using e-payments. Thus, the complete abandonment of cash could reduce consumer welfare. Maintaining both cash and cashless payment systems significantly raises the costs of the payment system, but this seems necessary.

## 6 | CONCLUSIONS

In our research, we attempt to go beyond the traditional debate on the choice of payment method. We focus on the psychological factors and consumers' perceptions of certain features of cash that make it an attractive option for them.

Consumers' holding of cash as an additional option depends on three main factors: attitude toward cash, especially the freedom it offers, unusual purchasing situations, and perceived card or mobile payment risk, which moderates the role of the attitude toward cash. The results showed that cash is often kept just in case, in connection with various unpredictable events. From a consumer's perspective, cash can be understood as a solution that provides security against unpredictable events.

Thus, we believe that eliminating cash significantly reduces consumer welfare. A possible transition to a cashless society requires a rethinking of these needs and proposing a solution that fulfills similar functions. The results of our study also support the significant change in the policies of governments and central banks towards cash that we have observed in the last few years (European Central Bank, 2023). Governments and central banks increasingly emphasize the need to leave cash in circulation. This change of view of cash is essential from the perspective of the monetary system's resistance to external shocks and from the perspective of individual economic entities. Our research on individual behavior shows that the perception of the role of cash by consumers for whom electronic payment is a typical payment channel has changed significantly and goes beyond the traditional function of the means of payment. From a consumer's perspective, cash can be understood as a backup solution that protects against situations in which electronic payments cannot be made. Leaving cash payment channels operational, even if they are not commonly used under normal conditions, allows them to be used during emergencies. Therefore, our research supports the regulatory policy recommendation that cash payment channels should remain operational even if they are not widely used under normal circumstances.

### AUTHOR CONTRIBUTIONS

**Jan Acedański:** methodology, data curation; formal analysis; writing—original draft, visualization. **Grzegorz Maciejewski:** research design; investigation; methodology, data curation; review & editing, funding acquisition. **Jacek Pietrucha:** conceptualization, research design;

methodology, investigation; writing—original draft; funding acquisition. All authors reviewed and approved the manuscript.

### CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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### ENDNOTES

- <sup>1</sup> Cashless payments are a broad concept that includes traditional payments (cheques, paper bank transfers) and electronic payments made using various instruments. These include payment cards and various mobile solutions, such as e-wallets (e.g., Google Pay or Apple Pay). Card and mobile payments are, therefore, only one of the cashless payment channels. However, in the realities of the Polish economy, traditional cashless payment channels (e.g., checks) no longer exist, and cashless payments at stationary POS are made only by cards or mobile. That is why we analyze the behavior of consumers who usually pay by card or mobile and no other cashless instruments.
- <sup>2</sup> Blik is a non-card mobile payment scheme in Poland that allows P2P and P2B payments using only phone numbers, payment in online stores and stationary POS, and cash withdrawal from ATMs. It is operated by major banks in Poland and is currently the most popular cashless payment method in Poland.
- <sup>3</sup> All data: European Central Bank (2022).

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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