Received 26 March 2021
Revised 2 April 2021
30 October 2021
Accepted 10 November 2021

Barriers to bank customers' intention to fully adopt digital payment methods

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Abstract

Purpose – The purpose of this study is to empirically investigate the relationship between a set of functional and social–psychological barriers and bank customers' intention to fully adopt digital payment methods (DPMs).

Design/methodology/approach – The data were collected via an online questionnaire sent to two samples of Swedish bank customers, namely, adopters-accepters (i.e. young bank customers) and adopters-resisters (i.e. a group opposing a cashless society). Hypotheses were tested by applying an ordinal regression model.

Findings – Regarding the adopters-accepters, privacy and access barriers can be obstacles to the full adoption of DPMs. The adopters-resisters perceived all five studied barriers as significant, though only the impersonalisation barrier seemed to matter when the barriers were related to their intention to fully adopt DPMs. Moreover, the results suggest that barriers have a stronger negative effect on the intention to fully adopt among those with extensive experience of DPMs.

Practical implications – Based on the barriers affecting the intention of particular groups of bank customers to adopt DPMs, banks could implement customised measures to promote the ongoing development of digital financial services.

Originality/value – In this under-researched area, this study provides empirical knowledge of the influence of various barriers on the intention of bank customers characterised as adopters-accepters and adopters-resisters to fully adopt DPMs.

Keywords Technology adoption, Retail banks, Digital innovations, Customer intention

Paper type Research paper

Introduction

Financial payment channels have developed significantly since the 1950s and 1960s when the first automated teller machines were introduced in the USA (Bátiz-Lazo *et al.*, 2014). For example, telephone banking in the 1980s was followed by internet banking in the 1990s and 10 years later by mobile banking (Jiménez and Díaz, 2019). Of particular interest is that

International Journal of Quality and Service Sciences
Vol. 14 No. 5, 2022
pp. 16-36
Emerald Publishing Limited
1756-669X
DOI 10.1108/IJQSS-03-2021-0045

various digital payment methods (DPMs) have gradually replaced cash, leading to both advantages and disadvantages for bank customers. That the "digital coin" has two sides has been described as follows: "Digitalisation makes payments easier and smoother but also creates risks that need to be managed" (Sveriges Riksbank, 2019, p. 4).

Most research has focussed on advantages related to the adoption of innovations such as internet banking and mobile banking, assuming that new technologies should be adopted because they are good enough (Laukkanen and Kiviniemi, 2010). The possibility of making digital transactions despite the time of day and location is beneficial for bank customers (Rehncrona, 2018; Zhang *et al.*, 2018) and banks have identified other advantages of DPMs, such as reducing bank branch, transportation and distribution costs (Bátiz-Lazo *et al.*, 2014; Lundberg *et al.*, 2014).

This raises the question of the possibility of a cashless society, as often discussed by governments and banks (although it mainly concerns bank customers). As the cashless society concept can be perceived in different ways (Bátiz-Lazo *et al.*, 2014; Rivera, 2019), this study applies the term "full adoption", i.e. a situation in which the only available payment methods are digital. Few studies (Lee *et al.*, 2005) have paid attention to the full-adoption phase, a phase more or less neglected in previous research. Instead, most studies have focussed on the initial adoption phase (Humbani and Wiese, 2019) or the post-adoption phase (Oertzen and Odekerken-Schröder, 2019).

As indicated, the movement towards the full adoption of DPMs requires attention to more than just benefits: one can imagine bank customers who are worried about their privacy and security, who cannot pay for their goods at the check-out, who must wait for hours to access their money or get proper service using DPMs. These risks are related to functionality (i.e. privacy, security and access) and to social–psychological issues such as impersonalisation. Trust can also be included in the latter risk category because of its significant impact on customers' behavioural intentions (Berraies *et al.*, 2017). Although other risks have been emphasised in the literature, the five mentioned above seem significantly related to DPMs (Featherman and Pavlou, 2003; Yang *et al.*, 2015).

Recent research on the increased adoption of DPMs has mostly been conducted in developing countries (Chawla and Joshi, 2019; Inegbedion *et al.*, 2019; Jain and Gabor, 2020). For example, the ongoing demonetisation in India has forced millions of people to start adopting DPMs despite the frequent use of cash payments and the risk of the financial exclusion of vulnerable groups (Sivathanu, 2019). One of the relatively few studies examining the DPM adoption process in a highly digital-based country was conducted by Arvidsson *et al.* (2017), but only from the Swedish merchants' perspective. This means that there is still a lack of research on the possible full adoption of DPMs from the customer perspective in developed countries such as Sweden, which could be the first country in the world that completely abandons cash (Sveriges Riksbank, 2019).

Although some DPM studies have investigated adopters versus non-adopters (Lian and Yen, 2013; Zhang *et al.*, 2018) or different groups of non-adopters (Laukkanen, 2016; Laukkanen *et al.*, 2008), there seems to be less research comparing various groups of adopters (Chaouali and Souiden, 2019). However, generations Y and Z have become increasingly attractive for banks and young bank customers (YBCs) are more interested in adopting new technologies and innovations than are other groups of customers (Tan and Leby Lau, 2016). Although studies have investigated young customers in general, there are calls for additional research on their financial consumption related to ongoing digital developments (Larsson *et al.*, 2016). In this study, the group of YBCs is characterised as adopters-accepters, i.e. individuals who have already adopted and are willing to continue to use DPMs. At the same time, some customers are used to resisting innovations such as DPMs (Laukkanen, 2016). In Sweden, there is such a formally organised group called Kontantupproret (KU), which comprises bank customers with diverse demographic

profiles eager to keep cash as a payment method (Arvidsson *et al.*, 2017). These are characterised as adopters-resisters.

The purpose of the study is to investigate the relationship between functional and social–psychological barriers, on one hand, and the intention to fully adopt DPMs, on the other, comparing the perceptions of the above groups of bank customers in Sweden, where traditional cash payments total just 6% of all payments (Sveriges Riksbank, 2019). Group differences are additionally examined in terms of the moderating role of past experience because it can affect how different barriers are perceived and may increase or decrease the intention to adopt DPMs (Laukkanen and Kiviniemi, 2010).

The remainder of this paper starts with a section addressing the frame of reference, including hypothesis development. A section on methods is followed by a presentation of the empirical results. A concluding discussion closes the paper.

Frame of reference and hypothesis development

Digital payment methods

An overall definition of digital payments is "payments made using electronic devices and channels" (Pizzol *et al.*, 2018, p. 634). Different researchers have used different terms, such as payment instruments (Karoubi *et al.*, 2016), cashless payments (Fabris, 2019), online payments (Yang *et al.*, 2015) and electronic money (Singh, 2004). The common denominator is that they all exclude cash as a payment method. As indicated, this study targets the possible full adoption of DPMs. In doing so, it considers the official DPMs regulated by the Swedish Government, i.e. bank cards (debit and credit cards), internet banking and mobile banking. Blockchain-related DPMs are currencies not under the control of governments and regulations (Sveriges Riksbank, 2019) and are, therefore, not treated here.

Perceived risks and innovation resistance

The theory of perceived risk (TPR) states that risks always entail accompanying benefits (Yousafzai, 2012). In the digital banking context, perceived risk has been defined as "the potential for loss in the pursuit of a desired outcome of using an e-service" (Featherman and Pavlou, 2003, p. 454) and as "a prominent barrier to customers' acceptance of online banking" (Lee, 2009, p. 130). This study applies the latter definition but focusses on several barriers impeding bank customers' intention to fully adopt DPMs. Perceived risks have been found to play a key role in the DPM adoption process (Yang *et al.*, 2015), so various risks may limit customer readiness to take further steps towards full adoption (Thomas *et al.*, 2016). Several studies have applied the technology acceptance model, related to TPR (Lee, 2009; Yang *et al.*, 2015). Considerably fewer studies have applied innovation resistance theory (IRT) to investigate perceptions of innovations (Kuisma *et al.*, 2007; Laukkanen, 2016); however, the risk barrier concept in IRT embraces topics such as privacy and security (Ram and Sheth, 1989).

It should be emphasised that although the concepts of perceived risks and resistance seem different, their operationalisation in the innovation context is often similar. Sheth (1981) reported on the significant role of perceived risks in innovation adoption and resistance and Ram and Sheth (1989) developed the perceived risk concept into functional and psychological barriers. Because of the overlapping of concepts, risks and barriers are used as synonyms here.

Hypothesis development

Functional barriers. Privacy is the ability of individuals to have control over their own private information (Johnson *et al.*, 2018). Different aspects of privacy such as monitoring, lack of control over private data and management reliance on this data can influence customers' ways of thinking and acting and Pizzol *et al.* (2018) and Shankar *et al.* (2020) have

highlighted that privacy issues may change customer behaviour in terms of digital payments. This indicates that both YBCs, with their limited financial experience and knowledge and the ones born in the cash era, may have concerns about how their private financial data are used in a digital world (Zhang *et al.*, 2018). Thus, both adopters-accepters and adopters-resisters can be exposed to the invasion of privacy because they already use DPMs. For example, vulnerable customers may easily be targeted by merchants because of the everyday monitoring of their financial behaviour on the internet (Larsson *et al.*, 2016) and obligatory acceptance of cookies may lead to unwanted tracking on bank websites (Yu *et al.*, 2016). Taken together, privacy is among the most-discussed risks on the road to the full adoption of DPMs by various groups of bank customers (Bátiz-Lazo *et al.*, 2014; Larsson *et al.*, 2016; Lundberg *et al.*, 2014; Rehncrona, 2018; Thomas *et al.*, 2016; Zhang *et al.*, 2018). The following hypotheses are formulated:

H1a, b. The higher the privacy barrier, the lower the intention of adopters-accepters (a) and adopters-resisters (b) to fully adopt DPMs.

Closely linked to privacy risk is a security risk (Shankar *et al.*, 2020). However, privacy and security are not always overlapping, as the monitoring of customers' habits by companies does not compromise their security but does invade their private life. Therefore, security risks are here treated as a separate functional barrier based on TPR (Lee, 2009). Mobile applications arguably offer relatively high security, not only online but also in physical shops (Thorngren, 2014). However, many customers perceive mobile payments as too easy to access and conduct and security is perceived to decrease when customers can use their money in a fast and easy way without any additional effort (Rehncrona, 2018). Based on previous research (Dahlberg *et al.*, 2015; Larsson *et al.*, 2016; Thomas *et al.*, 2016; Shin, 2021), security is identified as a significant risk in the digital payment process and Lian and Yen (2013) indicated that even adopters perceive security as a major risk because of the potential risk that data can be stolen and misused. Despite ongoing technical improvements, mobile payments are perceived as insecure (Rehncrona, 2018; Shankar *et al.*, 2020). The security level in e-commerce and m-commerce, therefore, affects customers' choice of payment methods, and will likely also affect their intention to use only DPMs. This leads to the following hypotheses:

H2a, b. The higher the security barrier, the lower the intention of adopters-accepters (a) and adopters-resisters (b) to fully adopt DPMs.

Access is related to usage and value barriers (Ram and Sheth, 1989). Based on previous studies (Auer and Böhme, 2020; Larsson *et al.*, 2016; Laukkanen, 2016), it seems as though DPMs can limit bank customers' access to their money. Therefore, the stability of DPMs via online channels is a sensitive matter for all adopters (Yang *et al.*, 2015). It is important that bank customers can quickly access useful assistance (Zhang *et al.*, 2018) or visit a physical bank office when disruptive issues arise (Shin, 2021). The importance of minimising disruption in digital banking is also emphasised because it impedes customers from accessing their money. Arvidsson *et al.* (2017) reported that bank customers must sometimes wait a long time to access their digital money or may be unable to pay for their purchases using DPMs. Wasted time and limited access to one's savings seem to be realities for all bank customers. The hypotheses are as follows:

H3a, b. The higher the access barrier, the lower the intention of adopters-accepters (a) and adopters-resisters (b) to fully adopt DPMs.

Social–psychological barriers Impersonalisation is a concept similar to service risk (Yang *et al.*, 2015) and is related to the lack of face-to-face communication in the digital banking context (Laukkanen and Kiviniemi, 2010). Kuisma *et al.* (2007) linked this barrier to customers' habits and how innovations can change their routines. Laukkanen *et al.* (2008) and Mozafari *et al.* (2021) stated that it is difficult to replace personal service with internet service, and that adopters of DPMs can be exposed to poor payment services (Yang *et al.*, 2015). Impersonalisation is related not only to habits and routines but also to service features such as waiting, time wasting and support availability related to telephone and online queues (Brown *et al.*, 2005).

Although impersonalisation is arguably a risk in bank–customer relationships (Bátiz-Lazo *et al.*, 2014; Singh, 2004), the differences between bank customer groups must be considered. Compared with other bank customers, younger ones are more interested in innovations and are seen as more adaptable to changes in a digital banking direction (Martins *et al.*, 2014; Shin, 2021; Tan and Leby Lau, 2016). Similarly, studies indicate that certain bank customers are generally more likely to be vulnerable when digital innovations are implemented in the banking sector (Guido *et al.*, 2020; Laukkanen *et al.*, 2008). They experience difficulties adopting innovations (Laukkanen, 2016), so traditional banking is the preferred financial channel for most of them (Jiménez and Díaz, 2019). The fact that the two groups seem to have different views of this matter leads to the following hypotheses:

H4a. The impersonalisation barrier is unrelated to adopters-accepters' intention to fully adopt DPMs.

H4b. The higher the impersonalisation barrier, the lower the intention of adopters-resisters to fully adopt DPMs.

Yang *et al.* (2015, p. 13) used the following definition of trust in the online payment context: "a psychological state leading to the willingness of customers to perform payment transactions over the internet and expect the payment platform fulfilling its obligations, irrespective of customers' ability to monitor or control payment platform's actions". This means that the fundamental role of trust as the basis of long-term relationships is highlighted in the offline and online bank–customer relationship (Berraies *et al.*, 2017; Mozafari *et al.*, 2021) and trust seems to remain crucial for customers even if they overcome other barriers (Poromatikul *et al.*, 2019).

Although trust is often related to the security of payment systems in terms of safeguarding private data (Shin, 2021; Singh, 2004), customers' trust in intermediaries during the payment stage depends on their choice of payment method (Rehncrona, 2018). For example, Swedish bank customers perceive digital banking to be relatively trustworthy because of Sweden's highly developed infrastructure (Dahlberg *et al.*, 2015). Customers' beliefs may also differ between big cities and rural regions in the same country, and depending on people's ages (Dimitrova and Öhman, 2021). For example, individuals fighting to keep cash as a payment method are more likely than others to express their resistance (Laukkanen, 2016) and to display less trust in alternative payment methods; at the same time, YBCs are more likely to trust new digital bank services (Yang *et al.*, 2015). The following hypotheses are formulated:

H5a. The trust barrier is unrelated to the intention of adopters-accepters to fully adopt DPMs.

H5b. The higher the trust barrier, the lower the intention of adopters-resisters to fully adopt DPMs.

Control variables

As this study focusses on various bank customers, age is of interest and is accordingly included as a control variable. Income (Johnson *et al.*, 2018; Martins *et al.*, 2014) and location (Yang *et al.*, 2015) are also considered important in this context, not least because the perceptions of DPMs may differ between high- and low-income individuals and between urban and rural dwellers (Dimitrova and Öhman, 2021). Past experience is considered because adopters already have experience of DPMs (Chaouali *et al.*, 2017). Gender is also found to be significant in this context (Jiménez and Díaz, 2019).

Method

Questionnaire development

Questions related to the barriers under study were primarily adopted from previous studies (Table 1). As can be seen, the privacy items (PB 1–3) and security items (SB 1–4) were based on Featherman and Pavlou (2003), Martins *et al.* (2014) and Yang *et al.* (2015), while the trust items (TB 1–3) were adopted from Featherman and Pavlou (2003), Poon (2008) and Van der Cruijsen *et al.* (2017). The access items (AB 1–3) and the impersonalisation items (IB1-5) were based on and modified from the literature mentioned in the Table. The last access item (A4) and the trust item T4, together with some of the abovementioned items, were inspired by a qualitative approach in the form of virtual passive observation (Kozinets, 2010). A single main method is normally considered sufficient to sustain a study, but as the use of an additional method may contribute to better research, virtual passive observation was used as a complementary method in formulating the questionnaire. For several weeks when preparing the current study, some of the main Swedish bank social media pages were observed with a focus on followers' comments regarding access, impersonalisation and trust items. The data obtained was manually analysed and relevant items were used in the questionnaire design (Table 1).

The questionnaire was cross-revised by the authors to limit potential bias (Podsakoff *et al.*, 2003). A pilot study was conducted and the feedback from 31 pilot respondents of various ages was used to improve the questions in terms of wording, phrasing and comprehensibility for different age groups.

The questionnaire included a short cover letter presenting the aim of the study and background questions (for the descriptive statistics regarding the background questions, see Table 2). The main part of the questionnaire comprised statements related to the five barriers (Table 1 in the "Empirical results" section), responded to using four-point Likert scales anchored at 1 (strongly disagree) and 4 (strongly agree). As respondents tend to overuse "neither" options, the lack of a midpoint option forced the respondents to choose non-neutral responses, helping avoid potential central tendency bias and social desirability bias (Albaum *et al.*, 2010; Nadler *et al.*, 2015).

Sampling and data collection

The online questionnaire was sent to YBCs (as representatives of adopters-accepters) with a focus on individuals 18–29 years old. This age range is common in young customer research

Table 1.
Reliability and validity tests

Construct	Item	Item description	Cronbach's α $n = 105/388$	Factor loadings $n = 105/388$	Reference
Privacy barrier			0.786/0.878		
	PB1	My personal information can be used without my knowledge when signing up to use DPMs		0.768/0.857	Modified from Featherman and Pavlou (2003), Martins *et al.* (2014)
	PB2	My digital transactions can be monitored and tracked		0.913/0.944	Modified from Yang *et al.* (2015)
	PB3	DPMs reveal my payment habits		0.833/0.895	Modified from Yang *et al.* (2015)
Security barrier			0.883/0.915		
	SB1	My bank account can be hacked		0.841/0.895	Modified from Yang *et al.* (2015)
	SB2	I can be exposed to fraud if I use DPMs		0.868/0.925	Modified from Featherman and Pavlou (2003), Martins *et al.* (2014)
	SB3	Worry about logging in via bank websites/apps or entering my bank card number		0.849/0.886	Modified from Featherman and Pavlou (2003), Martins *et al.* (2014)
	SB4	DPMs are not secure		0.888/0.867	Modified from Yang *et al.* (2015)
Access barrier			0.752/0.794		
	AB1	Forgotten/lost PIN code/password can be an obstacle to making digital transactions		0.627/0.712	Modified from Laukkanen (2016)
	AB2	I cannot make digital transactions due to system breakdowns		0.887/0.889	Larsson *et al.* (2016), virtual passive observation
	AB3	Technical problems with DPMs will lead to wasted time		0.841/0.847	Modified from Featherman and Pavlou (2003), Lee (2009), virtual passive observation
	AB4	More shops accept only DPMs		0.686/0.713	Virtual passive observation
Impersonalisation barrier			0.600/0.695		
	IB1	Waiting time is long in tele- or chat queues		0.637/0.720	Modified from Featherman and Pavlou (2003), virtual passive observation
	IB2	I find personal customer service more pleasant than self-service alternatives		0.588/0.793	Modified (reversed) from Laukkanen (2016), virtual passive observation
	IB3	Chatbots give better service than do bank employees		n/a*	Modified from Shin *et al.* (2020), Yang *et al.* (2015)

(*continued*)

Table 1.

Construct	Item	Item description	Cronbach's α n = 105/388	Factor loadings n = 105/388	Reference
	IB4	The lack of personal contact is an obstacle to relying on DPMs		0.774/0.756	Modified from Yang *et al.* (2015)
	IB5	I buy more when paying with DPMs		n/a*	Larsson *et al.* (2016)
	IB6	I want to have the possibility to choose between bank employees and chatbots if in need of support		0.707/0.642	Modified from Van der Cruijsen *et al.* (2017)
Trust barrier			0.455/0.441		
	TB1	I regularly check my digital transactions		0.639/0.601	Modified from Poon (2008)
	TB2	DPMs are risky		0.772/0.762	Modified from Featherman and Pavlou (2003)
	TB3	Option to choose between different payment methods (swish, internet banking, bank card and cash)		0.668/0.701	Modified from Van der Cruijsen *et al.* (2017), virtual passive observation
	TB4	DPMs work as they should		n/a*	Virtual passive observation
Intention to fully adopt DPMs	IF1	I plan to use only DPMs in the future	n/a	n/a	Modified from Chaouali *et al.* (2017)

Notes: n/a = Not applicable; *Items with weak correlations were removed; Cronbach's α: Adopters-accepters (YBCs) = 105, Adopters-resisters (KU) = 388; Factor loadings: Adopters-accepters (YBCs) = 105, Adopters-resisters (KU) = 388

Variables	Values	Adopters-accepters (YBCs) $n = 105$	Adopters-resisters (KUs) $n = 388$
Swedish bank customer	Yes	105 (100%)	388 (100%)
	No	NV	NV
Age, years	18–29	105 (100%)	23 (5.9%)
	30–41	n/a	63 (16.2%)
	42–53	n/a	92 (23.7%)
	54–65	n/a	129 (33.2%)
	>65	n/a	81 (20.9%)
Income per month	<SEK 20,000	89 (84.8%)	104 (26.8%)
	SEK 20,000–29,999	11 (10.5%)	105 (27.1%)
	SEK 30,000–39,999	2 (1.9%)	91 (23.5%)
	SEK 40,000–49,999	NV	27 (7.0%)
	SEK 50,000–59,999	NV	9 (2.3%)
	>SEK 59,999	3 (2.9%)	13 (3.4%)
	Do not want to share	3 (2.9%)	39 (10.1%)
Location	Big city (i.e. Stockholm, Göteborg or Malmö)	10 (9.5%)	113 (29.1%)
	City (population 50,000–200,000)	68 (64.8%)	79 (20.4%)
	Small city (population 15,000–50,000)	15 (14.3%)	71 (18.3%)
	Village (population under 15,000)	12 (11.4%)	125 (32.2%)
Payment usage frequency			
- Bank card	Never	NV	21 (5.4%)
	Rarely	4 (3.8%)	138 (35.6%)
	Often	33 (31.4%)	174 (44.8%)
	Very often	68 (64.8%)	55 (14.2%)
- Cash	Never	45 (42.9%)	10 (2.6%)
	Rarely	56 (53.3%)	71 (18.3%)
	Often	3 (2.9%)	170 (43.8%)
	Very often	1 (1.0%)	137 (35.3%)
- Internet banking	Never	6 (5.7%)	35 (9.0%)
	Rarely	24 (22.9%)	133 (34.3%)
	Often	44 (41.9%)	187 (48.2%)
	Very often	31 (29.5%)	33 (8.5%)
- Swish (mobile app)	Never	2 (1.9%)	112 (28.9%)
	Rarely	13 (12.4%)	183 (47.2%)
	Often	42 (40.0%)	84 (21.6%)
	Very often	48 (45.7%)	9 (2.3%)
Gender	Male	49 (46.7%)	205 (52.8%)
	Female	55 (52.4%)	181 (46.6%)
	Other	1 (1%)	2 (0.5%)

Interval (Likert scale)	Min	Max	Mean (SD) $n = 105$	Mean (SD) $n = 388$	VIF $n = 105$	VIF $n = 388$
Privacy barrier (PB1–3)	3	12	6.80 (2.577)	9.95 (2.442)	1.516	1.906
Security barrier (SB1–4)	4	16	8.71 (3.069)	11.74 (3.502)	1.421	1.874
Access barrier (AB1–4)	4	16	7.71 (2.871)	12.70 (2.877)	1.597	1.888
Impersonalisation barrier (IB1, 2, 4 and 6)	4	16	9.49 (2.739)	13.09 (2.632)	1.623	1.954
Trust barrier (TB1–3)	3	12	7.89 (1.913)	9.47 (1.839)	1.593	2.025
Intention (IF1)	1	4	2.98 (0.930)	1.18 (0.552)	n/a	n/a

Table 2.
Descriptive statistics

Notes: YBCs = Young bank customers; KU = Kontantupproret; n/a = Not applicable; NV = No value; SD = Standard deviation; VIF = Variance inflation factor

(Lachance, 2012) and these individuals are over Sweden's age of legal consent, i.e. 18 years. The YBC group was chosen based on the demographic characteristics and similar behaviour of young university students (Tan and Leby Lau, 2016; Yang *et al.*, 2015). Teachers of nine randomly selected education programmes at a Swedish university were contacted to distribute the online questionnaire to their students via their course platforms or by email in the spring of 2020. In total, 913 students were reached and 105 completed questionnaires were received after three reminders. The response rate of 11.5% is considered relatively acceptable, as most online surveys are characterised by very low response rates (Baltar and Brunet, 2012).

In parallel, the questionnaire was published on the KU social media page, which had more than 13,000 followers at the time of the study. Of those, 1,600 were active followers considered potential questionnaire respondents (as representatives of adopters-resisters). This group consists of a broad range of individuals with a common interest in keeping cash as a payment method (Arvidsson, 2014). Over three weeks in the spring of 2020, 388 completed questionnaires were gathered from these respondents, for a response rate of 24.2%.

Data analysis and model specification

Construct reliability was tested using Cronbach's α test. In the next analytical step, the item values of each of the five constructs were summated into one new factor for each construct, which is a standard procedure in social science studies. However, as recommended by Shevlin *et al.* (1997), a factor analysis was conducted to justify the aggregation of items into factors. Descriptive analysis of frequencies was conducted to give an overall view of the background questions, and a Spearman correlation analysis was conducted. In addition, the variance inflation factor (VIF) was used to test for multicollinearity.

The hypotheses were tested using ordinal logistic regression (OLR), applied by Laukkanen (2016) when testing hypotheses in this research field. OLR was used given the ordinal character of the dependent variable. Dittrich *et al.* (2007) discussed the possibility of using summed Likert scale data as parametric data. Accordingly, the five variables based on summed item responses were analysed as covariates in OLR for each sample. Due to the common warning regarding empty cells with zero frequencies, the results of goodness-of-fit testing can be uncertain and considered a limitation. According to Smith and McKenna (2012), however, this issue does not affect other types of OLR tests, so their results can be analysed and taken into consideration.

The underlying OLR estimation equation for both samples is as follows:

$$Y = \beta_0 + \sum_{j,1}^{k} \beta jXi,j + \mu_j \text{where}$$

Y = dependent variable.

β_O = constant.

β_j = parameter to be estimated.

X_{ij} = the independent variables.

u_i = random error.

Considering that Chaouali *et al.* (2017) have called for attention to the influence of past experience on bank customers' intention to use DPMs, the moderating effect of all respondents' experiences was tested in an additional analysis (n = 493). The software extension PROCESS macro was used.

Empirical results

Table 1 Presents the constructs, items, item descriptions, Cronbach's α coefficients, factor loadings and references related to each item. For four of the five constructs, the Cronbach's α coefficients are above 0.60, which is considered acceptable (Laukkanen and Kiviniemi, 2010). The exception is the trust construct, for which the coefficients are around 0.45 for the two samples. However, reliability test results can vary based on the type of scale used, and lower values can be assumed for four-point Likert scales (Nadler *et al.*, 2015). therefore, the trust construct was kept for further analyses.

The factor loadings exceed the recommended level of 0.5 (Gupta and Arora, 2017), confirming a strong correlation between items, except for two impersonalisation items (IB3 and IB5) and one trust item (TB4), which were removed from further analyses. The five summated variables, which correspond to the main constructs, were used in the ordinal regression analysis. The result of the VIF test indicates a fairly low risk of multicollinearity. All values are below the "rule of thumb" maximum accepted coefficient of 10 (Lee, 2009).

Table 2 presents the descriptive statistics. All of the respondents had at least one account in a Swedish bank. Every YBC respondent was 18–29 years old, while the KU group included individuals of various ages. The YBC group reported lower income levels than did the KU group, which was natural given that the YBCs were students. Regarding location, most YBCs (64.8%) lived in cities (population 50,000–200,000), while the KU respondents were fairly equally distributed among the location alternatives. Past experience shows that the YBCs, on average, are more familiar with DPMs than are the KU respondents; however, for cash the situation was reversed. The gender distribution was fairly equal in both groups, though there were slightly more women among the YBCs and slightly more men among the KU respondents.

Table 2 also presents the minimum and maximum values, means and standard deviations of the summated variables for the two samples. Note that the number of variable items differs, which affects the minimum, maximum and mean values. Also note that the KU group has significantly higher mean values for every barrier, while the intention to use only DPMs is higher in the YBC group.

Spearman correlation coefficients are shown in Tables 3 and 4. For the YBC group, there are negative and significant relationships between the privacy items (PB1–3) and the dependent variable, i.e. the intention to fully adopt DPMs. The other barriers have one item each, i.e. SB1, AB4, IB4 and TB2, that is significantly correlated to the dependent variable. The correlation analysis based on the KU group indicates significant negative relationships between almost all independent variable items and the dependent variable, the only exceptions being AB1 and TB1.

The empirical results of the OLR analysis indicate that most relationships are insignificant for both groups (Table 5, Panels A and B). Four hypotheses are supported for the YBC group while four hypotheses are rejected for the KU group (Table 6).

Two of the three functional barriers are in line with the hypotheses for the YBCs, while all three hypotheses are rejected for the KU group. *H1* states that a higher privacy barrier leads to a lower intention to fully adopt DPMs. The regression results in a negative sign at the 5% significance level for the adopters-accepters, indicating that YBCs with higher concerns about privacy issues are less likely to fully adopt DPMs. For the adopters-resisters, the results indicate that the privacy barrier has no significant influence on the intention to fully adopt DPMs, so *H1a* is supported while *H1b* is rejected. *H2a* and *H2b* are rejected because the results indicate that the security barrier has no significant influence on the intention to use only DPMs among either YBCs or the KU group. Moreover, access problems could be an obstacle among adopters-accepters ($p < 0.05$), which is in line with *H3a*.

Construct	PB1	PB2	PB3	SB1	SB2	SB3	SB4	AB1	AB2	AB3	AB4	IB1	IB2	IB4	IB6	T1	T2	T3	Intention
PB1	1.000																		
PB2	0.564**	1.000																	
PB3	0.365**	0.652**	1.000																
SB1	0.638**	0.475**	0.274**	1.000															
SB2	0.568**	0.409**	0.299**	0.716**	1.000														
SB3	0.521**	0.405**	0.259**	0.571**	0.615**	1.000													
SB4	0.521**	0.460**	0.265**	0.638**	0.654**	0.728**	1.000												
AB1	0.296**	0.105	0.157	0.371**	0.435**	0.492**	0.387**	1.000											
AB2	0.289**	0.359**	0.251**	0.416**	0.410**	0.395**	0.310**	0.448**	1.000										
AB3	0.303**	0.385**	0.337**	0.253**	0.286**	0.309**	0.241*	0.406**	0.686**	1.000									
AB4	0.207*	0.271**	0.262**	0.287**	0.295**	0.253**	0.402**	0.229*	0.502**	0.488**	1.000								
IB1	0.339**	0.318**	0.318**	0.199*	0.256**	0.262**	0.213*	0.393**	0.420**	0.478**	0.253**	1.000							
IB2	0.190	0.141	0.275**	0.092	0.036	0.036	0.143	−0.146	0.061	0.040	0.198*	0.092	1.000						
IB4	0.312**	0.295**	0.358**	0.269**	0.294**	0.319**	0.312**	0.256**	0.377**	0.323**	0.382**	0.385**	0.288**	1.000					
IB6	0.096	0.149	0.223*	0.013	0.116	0.299**	0.308**	0.165	0.232*	0.244*	0.263**	0.264**	0.262**	0.295**	1.000				
TB1	−0.035	0.204*	0.196*	0.111	0.101	0.150	0.115	0.208*	0.316**	0.141	0.078	0.179	−0.099	0.066	0.170	1.000			
TB2	0.497**	0.449**	0.283**	0.569**	0.549**	0.567**	0.605**	0.356**	0.473**	0.392**	0.537**	0.319**	0.084	0.397**	0.215*	0.238*	1.000		
TB3	0.162	0.128	0.101	0.217*	0.300**	0.335**	0.333**	0.202*	0.262**	0.139	0.193*	0.164	0.179	0.099	0.450**	0.179	0.257**	1.000	
Intention	−0.250**	−0.193*	−0.240*	−0.222*	−0.191	−0.170	−0.126	−0.052	−0.170	−0.175	−0.518**	−0.014	−0.018	−0.310**	−0.067	−0.015	−0.299**	0.052	1.000

Notes: **Correlation is significant at the 0.01 level (two-tailed), * Correlation is significant at the 0.05 level (two-tailed); n = 105; YBCs = Young bank customers; PB1–3 = Privacy barriers; SB1–4 = Security barriers; AB1–4 = Access barriers; IB1, 2, 4 and 6 = Impersonalisation barriers; TB1–3 = Trust barriers; Intention = Intention to fully adopt DPMs

Table 3. Spearman correlation analysis for adopters-accepters (YBCs)

Table 4.
Spearman correlation analysis for adopters-resisters (KU)

Construct	PB1	PB2	PB3	SB1	SB2	SB3	SB4	AB1	AB2	AB3	AB4	IB1	IB2	IB4	IB6	T1	T2	T3	Intention
PB1	1.000																		
PB2	0.705**	1.000																	
PB3	0.572**	0.788**	1.000																
SB1	0.612**	0.441**	0.402**	1.000															
SB2	0.626**	0.488**	0.421**	0.829**	1.000														
SB3	0.511**	0.396**	0.376**	0.714**	0.734**	1.000													
SB4	0.610**	0.513**	0.433**	0.661**	0.713**	0.708**	1.000												
AB1	0.396**	0.305**	0.338**	0.474**	0.488**	0.473**	0.427**	1.000											
AB2	0.457**	0.377**	0.378**	0.379**	0.437**	0.388**	0.451**	0.524**	1.000										
AB3	0.466**	0.371**	0.388**	0.400**	0.456**	0.403**	0.478**	0.479**	0.683**	1.000									
AB4	0.404**	0.437**	0.447**	0.260**	0.317**	0.261**	0.327**	0.285**	0.487**	0.409**	1.000								
IB1	0.471**	0.384**	0.371**	0.408**	0.470**	0.376**	0.445**	0.394**	0.468**	0.539**	0.314**	1.000							
IB2	0.298**	0.297**	0.251**	0.300**	0.339**	0.318**	0.352**	0.207**	0.281**	0.353**	0.363**	0.372**	1.000						
IB4	0.380**	0.277**	0.268**	0.367**	0.390**	0.366**	0.446**	0.309**	0.357**	0.391**	0.316**	0.437**	0.408**	1.000					
IB6	0.222**	0.267**	0.267**	0.242**	0.248**	0.221**	0.284**	0.216**	0.292**	0.251**	0.340**	0.223**	0.430**	0.310**	1.000				
TB1	0.167**	0.113*	0.101*	0.188**	0.177**	0.112*	0.151**	0.102*	0.132**	0.210**	0.119*	0.105*	0.101*	0.156**	0.214**	1.000			
TB2	0.587**	0.449**	0.417**	0.611**	0.669**	0.634**	0.692**	0.411**	0.424**	0.475**	0.341**	0.448**	0.361**	0.467**	0.261**	0.212**	1.000		
TB3	0.230**	0.271**	0.236**	0.206**	0.220**	0.253**	0.282**	0.147**	0.250**	0.239**	0.371**	0.187**	0.328**	0.234**	0.345**	0.137**	0.262**	1.000	
Intention	−0.211**	−0.255**	−0.228**	−0.162**	−0.209**	−0.172**	−0.211**	−0.083	−0.192**	−0.212**	−0.417**	−0.184**	−0.172**	−0.183**	−0.241**	−0.039	−0.242**	−0.237**	1.000

Notes: **Correlation is significant at the 0.01 level (two-tailed), * Correlation is significant at the 0.05 level (two-tailed); n = 388; KU = Kontantupproret; PB1–3 = Privacy barriers; SB1–4 = Security barriers; AB1–4 = Access barriers; IB1, 2, 4 and 6 = Impersonalisation barriers; TB1–3 = Trust barriers; Intention = Intention to fully adopt DPMs

	Estimate	Std. error	Wald	Df	Sig.	95% Confidence interval Lower bound	95% Confidence interval Upper bound
Panel A		Summary results of OLR for adopters-accepters (YBCs) (dependent variable: intention to fully adopt DPMs)					
Privacy barrier	−0.254	0.110	5.343	1	0.021*	−0.470	−0.039
Security barrier	0.058	0.089	0.425	1	0.514	−0.116	0.232
Access barrier	−0.242	0.092	6.945	1	0.008*	−0.423	−0.062
Impersonalisation barrier	0.096	0.090	1.153	1	0.283	−0.080	0.272
Trust barrier	−0.040	0.128	0.099	1	0.753	−0.210	0.290
Panel B		Summary results of OLR for adopters-resisters (KU) (dependent variable: intention to fully adopt DPMs)					
Privacy barrier	−0.005	0.110	0.002	1	0.964	−0.210	0.220
Security barrier	−0.014	0.080	0.31	1	0.860	−0.172	0.143
Access barrier	−0.064	0.083	0.589	1	0.443	−0.226	0.099
Impersonalisation barrier	−0.216	0.086	6.296	1	0.012*	−0.384	−0.047
Trust barrier	−0.200	0.119	2.816	1	0.93	−0.434	0.034

Notes: Panel A: Link function: Logit.; Model fitting information $p = 0.012$; Goodness of fit $p = 0.703$; Pseudo R^2: Cox and Snell 0.258; Nagelkerke 0.281; Test of parallel lines $p = 0.145$; YBCs = Young bank customers; $^{**}p < 0.01$; $^{*}p < 0.05$. Panel B: Link function: Logit.; Model fitting information $p = 0.000$; Goodness of fit $p = 1.000$; Pseudo R^2: Cox and Snell 0.177; Nagelkerke 0.295; Test of parallel lines $p = 1.000$; KU = Kontantupproret; $^{**}p < 0.01$, $^{*}p < 0.05$

Table 5. Summary results of OLR for adopters-accepters (YBCs) and adopters-resisters (KU)

Regarding adopters-resisters, *H3b* is rejected due to the lack of a relationship between the variables.

Regarding the first social–psychological barrier, *H4a* states that no relationship could be found between the impersonalisation barrier and the intention to fully adopt DPMs among YBCs ($p = 0.283$), while *H4b* states that a higher impersonalisation barrier leads to a lower intention to fully adopt DPMs among the KU respondents ($p = 0.012$). Accordingly, both

Hypothesis	Test results: Adopters-accepters (YBCs)	Test results: Adopters-resisters (KU)
H1 (a negative relationship between the privacy barrier and the intention to fully adopt DPMs according to both groups)	Supported	Rejected
H2 (a negative relationship between the security barrier and the intention to fully adopt DPMs according to both groups)	Rejected	Rejected
H3 (a negative relationship between the access barrier and the intention to fully adopt DPMs according to both groups)	Supported	Rejected
H4 (no relationship for the YBC group and a negative relationship for the KU group between the impersonalisation barrier and the intention to fully adopt DPMs)	Supported	Supported
H5 (no relationship for the YBC group and a negative relationship for the KU group between the trust barrier and the intention to fully adopt DPMs)	Supported	Rejected

Notes: YBCs = Young bank customers; KU = Kontantupproret

Table 6. Hypothesis test results

hypotheses are supported. *H5a* is supported while *H5b* is rejected, as the results indicate that the trust barrier is insignificant for both groups.

The additional analysis regarding the three significant barriers (i.e. privacy, access and impersonalisation) shows that the interaction terms of the DPM experience are negative and significant ($p < 0.001$). Table 7 indicates that these barriers have a stronger (weaker) negative effect on the intention to fully adopt DPMs by bank customers with high (low) DPM experience. For example, a person using DPMs more often than another person will likely suffer more from access issues, which tend to decrease the intention to fully adopt.

Discussion and concluding remarks

It can be noted that the two groups of Swedish bank customers have different views of the barriers, in that the KU group has significantly higher mean values for every barrier. Representing adopters-resisters, they are obviously more opposed to the gradual replacement of cash with DPMs (Arvidsson, 2014) and to DPMs as the only available payment alternative. Considering that 80% of the KU respondents reported using cash payments often or very often, this group tends to fight for cash in behavioural terms as well.

The corresponding proportion of DPM adopters-accepters who use cash as a common payment method is 4%. Accordingly, the YBC group seems to represent bank customers who find that digital services help them conveniently conduct their daily transactions (Gomber *et al.*, 2017). However, two functional barriers (i.e. privacy and access barriers) are negatively related to the full adoption of DPMs by this group. This matches the results presented by Laukkanen *et al.* (2008). Based on their knowledge of new technologies, YBCs seem to have concerns about their digital payments being tracked and about how their private financial data can be used. The possibility of banks and other authorities tracking customers' online payment activities, possibly leading to the invasion of private life and to privacy issues, can therefore, be seen as a serious barrier. This is related to Larsson *et al.*'s (2016) suggestion that YBCs are more sensitive than are other bank customers to the privacy implications of digital payments and are, therefore, keen to have control over their own private information. Another possible reason, given that the studied YBCs are university students, is that highly educated individuals are particularly concerned about privacy issues (Poon, 2008). Moreover, the significant influence of access barriers on the intention to fully adopt DPMs could be due to the impatience of YBCs (Kamalul Ariffin *et al.*, 2018). Although they are fast learners who are open to innovations, having limited access to their money or experiencing delayed digital payments could lead to irritation and anger, which are characteristics of impatience. The access barriers perceived by the YBCs indicate a desire for the technical improvement of DPMs and related systems.

For the KU respondents, privacy and access barriers are insignificant, suggesting that their resistance to the full adoption of DPMs is based mostly on other considerations. A

Table 7.
Moderation analysis results

Direct relationships	Moderator: past experience Effect	*t*-value	Sig.
Privacy barrier – intention to fully adopt DPMs	−0.0369	−6.6087	0.0000*
Access barrier – intention to fully adopt DPMs	−0.0271	−6.4953	0.0000*
Impersonalisation barrier – intention to fully adopt DPMs	−0.0310	−6.2532	0.0000*

Notes: Effect = Interaction terms; $n = 493$; Model sig., 0.0000; *$p < 0.001$

possible reason for this is that these bank customers use DPMs too infrequently to be upset about privacy and access issues.

It has been suggested that bank customers tended to perceive payment via mobiles as too easy when this payment alternative was introduced, so this payment option was seen as insecure (Rehncrona, 2018). Although studies have emphasised the importance of both security and trust among DPM adopters (Lian and Yen, 2013; Yang *et al.*, 2015), the current results are not in line with this. Neither group perceived security or trust issues as significant barriers. Regarding the security barrier, Sweden is among the countries with the least card fraud (Sveriges Riksbank, 2019), which certainly influences the notion of a high security level from an international perspective. As trust is often related to security (Dahlberg *et al.*, 2015; Singh, 2004), it is logical that trust is also perceived as an insignificant barrier in this case. Moreover, Sweden is known as a country with a relatively high level of trust. For example, the World Values Survey (2010–2014) suggested that 60% of the population in Sweden agreed that most people can be trusted, which is a significantly higher level than in most other countries. Similarly, Swedish bank customers generally perceive DPMs as trustworthy because of Sweden's well-developed banking infrastructure (Dahlberg *et al.*, 2015).

Of interest is that impersonalisation is the only significant barrier for the KU respondents. Chaouali and Souiden (2019) and Laukkanen (2016) have reported that many older bank customers prefer personal contact, and cash payments in fact entail face-to-face transactions. In addition, elderly Swedish bank customers are those who primarily visit traditional bank branches (Sveriges Riksbank, 2019). This indicates the lack of such human characteristics as sympathy and warmth in the digital world. For the YBCs, there is no significant relationship between the impersonalisation barrier and the intention to fully adopt DPMs, which is in line with the findings of Tan and Leby Lau (2016).

The results presented here could be of interest to governments and banks, especially in Sweden but also in other developed countries. Governments have to consider various parties' interests and, not least, the particular risks inherent in a one-dimensional digital payment system. For example, the financial exclusion of certain groups of bank customers must be considered, and there are strong warning signals that being exclusively reliant on DPMs could cause major disruptions in the event of a long power failure (Sveriges Riksbank, 2019). Banks have to consider the relatively high costs of using cash (Arvidsson *et al.*, 2017) and promote a range of requested and convenient DPMs to satisfy various groups of bank customers.

On the way to realising a payment system potentially limited to digital payments, it is important to gather up-to-date knowledge of customers' opinions, as even successful companies can fail in implementing customer-based innovations (Joachim *et al.*, 2018). The present results indicate that there are barriers to the intention to fully adopt DPMs that cannot simply be ignored, and that these barriers vary depending on the bank customer category. Given that privacy and access issues seem to be significant barriers for adopters-accepters, every bank and the banking industry as a whole should take appropriate actions to solve current and future problems in this functionality field. The required actions include more than just following the General Data Protection Regulation regarding privacy issues and more than just repeating standardised messages about technical errors regarding access issues. Given that impersonalisation seems to be a significant obstacle for adopters-resisters, the banking industry should acknowledge that traditional face-to-face communication is still preferred by these bank customers (Chaouali and Souiden, 2019). Addressing social–psychological issues could decrease the resistance to using only DPMs. Thus, banks should be aware of the potential for financial exclusion, and a solution could be to offer multiple

payment channels. Keeping brick-and-mortar bank branches will likely attract those who resist innovations.

The way towards a cashless society could also be related to the finding that bank customers with extensive experience of DPMs are more negatively affected by the privacy, access and impersonalisation barriers regarding their intention to fully adopt DPMs. Therefore, banks would benefit from also focussing on preventing adopters-accepters from eventually becoming adopters-resisters.

As this study focusses on barriers related to DPMs only in Sweden, it is recommended that cross-cultural studies be conducted. Such studies could consider DPMs' various advantages, which could be compared with the barriers examined here but applied to various categories of bank customers from other countries. This could help banks not only to reduce barriers but also to strengthen the advantages related to DPMs. Based on the results of our additional analysis, it also seems as though customers' past experiences of DPM are worth investigating in more detail than was done here.

Another limitation is that our approval to access YBCs via one or several banks was refused for bank security reasons, and that the studied YBC group was limited to university students. Accessing a larger group of YBCs through banks could enrich our knowledge of these bank customers. At the same time, sampling university students enabled this study to avoid limitations related to a sample associated with a single bank because the sampled YBCs were customers of various banks. A larger number of respondents could also be desirable in future studies.

Additional studies using other methods would be of value because of the general limitations of questionnaire research, including social desirability bias and the risk of focussing on bank customers' recalled rather than "lived" perceptions. Such studies could also connect the TPR more clearly to the IRT than could be done in this empirically-oriented study. Moreover, this study did not cover blockchain-related DPMs, cryptocurrencies or e-currencies such as the e-krona. Such extended research could provide a broader overview of future payment methods and of how they are perceived by adopters-accepters and adopters-resisters.

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