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Perceived Risk as a Determinant of Propensity to Adopt Account Information Services under the EU Payment Services Directive 2

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Abstract: Globalisation, technological advances, liberalisation of financial markets, and changing consumer behaviour are transforming banking profoundly. Under the EU Payment Services Directive 2 (PSD2), incumbent banks must open up their data, processes, and business functionalities to customers and third parties including rivals. It is critical to understand consumer behaviour post-PSD2, and the potential impact of PSD2 on the functioning of the retail banking and financial services market. In this preliminary study of 244 consumers from six European countries, we explore the role of social influence, facilitating conditions, perceived risk, and effort and performance expectancy in order to unravel the determinants of consumers' acceptance of account information services (AIS) as provisioned under PSD2, which provide consolidated bank account information for consumers with multiple bank accounts across multiple banking institutions. Our findings suggest that the competing influences of (a) positive perceptions such as social influence, facilitating conditions, and performance expectancy, and (b) negative perceptions related to risk, sway consumers' intentions to adopt AIS.

Keywords: technology adoption; open banking; payment service directive 2; account information services

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1. Introduction

The ubiquitous use of digital technologies is transforming how society operates and interacts [1]. The retail banking sector is not immune to these changes, although it has been slower than other sectors to respond [2]. Retail and commercial banks are facing unprecedented pressure and disintermediation from changing consumer behaviour, rapid technology-driven innovation, and a changing regulatory environment that is forcing incumbent banks to provide access to accounts (XS2A) [3]. Together these changes serve to alter the nature and intensity of competition dramatically, particularly in the Internet and mobile banking and payments market. In addition to traditional rivals, incumbent banks and payment providers face competition from challenger banks, payment service providers, credit intermediation platforms, financial technology (FinTech) firms, and so-called BigTech, e.g., Google, Microsoft, Amazon, Facebook, IBM, Apple, Baidu, Alibaba, Tencent (sometimes referred to as the Big Nine or G-MAFIA BAT), amongst others [2,4]. Furthermore, the European Union (EU) has introduced a number of regulations to support the development of a single payment market, which also significantly impacts the retail banking sector.

The first Payment Services Directive (PSD1) (Directive (EU) 2007/64/EC) came into force across the EU in 2009 and established common rules for certain types of electronic payments. In January 2018, a revised and complementary Payment Services Directive (PSD2) (Directive 2015/2366/EU) came into effect in the EU to take into account technological innovation during the period since PSD1. PSD2 is a mandatory regulation for financial institutions operating within the EU that seeks to (i) make it easier and safer

to use internet payment services; (ii) enhance consumer protection against fraud, abuse, and payment-related issues; (iii) increase the adoption innovative mobile and internet payment services; (iv) strengthen consumer rights; and (v) strengthen the role of the European Banking Authority (EBA) to coordinate supervisory authorities and draft technical standards [5]. To open up the EU payment market, PSD2 requires significant structural changes. It requires banks to implement and make available three innovations on a non-discriminatory basis: (i) account information services (AIS); (ii) payment initiation services (PIS); and (iii) fund availability confirmation services [6]. Under PSD2, secure account data access must be made available to third parties, including rivals. Furthermore, recognising increased globalisation, PSD2 applies even when only one party is located in the European Union.

Our paper is one of the first papers to explore the determinants of European consumer acceptance of AIS. AIS enables consumers and businesses to have a single consolidated view of their financial situation across multiple accounts and financial service providers. In this way PSD2 erodes the information advantage incumbent banks had over competition and potential market entrants. PSD2 provides a legal basis for both incumbent banks and payment providers to gain access to customer account information, but more importantly provides a platform for BigTech firms to enter the market, while small-to-medium sized players may not have the brand recognition, customer relationships, international presence, and technical or financial resources to compete with well-established incumbents, firms such as the G-MAFIA BAT certainly do. As such it is critical, for both policymakers and industry, to understand consumer willingness to adopt AIS in order to understand the potential impact of PSD2 and inform policy and strategy.

The primary objective of our study is to elucidate the factors which might drive or inhibit European consumer acceptance and adoption of AIS. In this study, we survey 244 consumers from six European countries on their perceptions of risk across the dimensions of psychological, financial risk, performance, time, privacy risk, social and overall risk, as well as their perceptions of performance expectancy, effort expectancy, facilitating conditions and social influence. By focusing on AIS and using a pan-European sample, this paper makes an important and early contribution to the literature on PSD2 and AIS adoption, and mobile and internet banking adoption more generally. As well as contributing to our understanding of different types of perceived risk and consumer intention to adopt payment innovations, our study makes a theoretical contribution to the Unified Theory of Acceptance and Use (UTAUT) by increasing the explanatory power of the UTAUT model.

The remainder of the paper is organised as follows. In the next section, we discuss relevant literature in the mobile and internet payment context. UTAUT and perceived risk are used to develop the research model and hypotheses in Section 3. This is followed by an overview of the methodology employed. Section 4 presents the analysis and is followed by a discussion of the findings. The paper concludes with a brief summary of the contribution of the study, limitations, and opportunities for future research.

2. Literature Review

There is a well established literature on the adoption of internet and mobile banking drawing from the range of established technology adoption and diffusion models and theories. For example, Diffusion of Innovation (DOI), Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Unified Theory of Acceptance and Use of Technology (UTAUT) all feature prominently in the literature [7].

Both DOI Theory and TPB situate the adoption decision within a social system and posits that an individual's intention to adopt an innovation is determined by their attitude towards the innovation, subjective norms or social influence, and perceived, not actual, behavioural control or the self-perception of capability to adopt the innovation [8]. For example, Tan and Two [9] combine DOI and a decomposed version of TPB, based on [10], to identify the attitudinal, social and perceived behavioural control factors that influence the adoption of Internet banking in Singapore. Their findings suggest that compatibility,

trialability, perception of Internet risk, confidence, and perception of government support for e-commerce were influential factors in the adoption of Internet banking, while social influence was not. Subsequent studies using TPB are consistent with these findings [11–13]. While influential, DOI has largely been subsumed by TAM and UTAUT in recent technology acceptance research in internet and mobile banking [7]. TAM provide improved measures for two key determinants of user acceptance variables—perceived usefulness (PU) and perceived ease of use (PEOU) [14]. Studies have found that PU is a strong predictor of intention to adopt Internet banking [12,15–17] and mobile banking [7,18,19]. For many, TAM's power is in its simplicity, comprehensibility, and operationalisability from a research perspective. However, this is also seen as its weakness in that it lacks resolution and therefore, while there are many studies, contributions are incremental and may be difficult to translate in to practice [20].

UTAUT was an attempt to synthesise the main technology acceptance approaches in to one unified model [21]. UTAUT comprises four main constructs—performance expectancy, effort expectancy, social influence, and facilitating conditions—that influence behavioural intention to use a technology and/or technology use [22]. Individual difference variables, such as age, gender, experience, and voluntariness were also incorporated as moderating factors [21]. For individual consumer technology acceptance, UTAUT was expanded (UTAUT2) to include hedonic motivation (or perceived enjoyment), price value (the tradeoff between perceived benefits and monetary costs), and habit, while voluntariness was removed [22]. UTAUT2 is particularly relevant as the first application of the model was mobile internet adoption, a critical building block of modern Internet banking and payment.

Martins et al. [23] combined UTAUT and perceived risk to explore behaviour intention in relation to Internet banking in Portugal. In line with prior research, they found performance expectancy, effort expectancy, and perceived risk as important influencers of Internet banking behaviour. Furthermore, and in contrast to [10], Martins et al. [23] found that social influence was also shown to have a significant effect, albeit small, on behaviour. UTAUT combined with perceived risk provided stronger predictive power than other studies on Internet banking. This addition of perceived risk is critical in the context of mobile banking as repeated studies suggest that perceived risk adversely impacts mobile banking adoption [24–29]. This includes financial, security, and privacy risks, amongst others. Alalwan et al. [30] extended UTAUT2 with trust to explore mobile banking acceptance in Jordan. Their findings suggest that all factors, except social influence, significantly and positively influenced behavioural intention and adoption [30]. The inconsistent findings regarding social influence serve as an example of the mixed findings one can experience when using UTUAT2 in different contexts. The effectiveness of these models can be improved by extending UTAUT with additional variables. For example, Khan et al. [31] explore online banking adoption using UTAUT2 moderated by cultural variables. They find that cultural dimensions, collectivism, and uncertainty avoidance were significant moderators in explaining behavioural intentions and usage behaviour for online banking [31].

Given the relative novelty of PSD2, empirical research on behaviour intention and usage behaviour with respect to AIS is limited. AIS assumes the sharing of customer account data with other banks and third party providers, while there are numerous articles that suggest privacy and security concerns will be significant barriers to AIS adoption, there are few published empirical studies. In a study of Dutch consumers, Bijlsma et al. [32] find that propensity to use AIS is driven by trust in the providers of these services, while respondents suggested that their preference was to share data with their own bank, the decision to allow others to use financial data, for examples for loan approval, is influenced by financial incentives [32]. As such, it would seem that the price value trade-off matters when it comes to AIS adoption and usage, while the [32] study has a substantial sample of Dutch consumers, the Dutch internet and mobile banking market is significantly more advanced than other European markets [33,34] and as such findings of [32] may not be representative of the wider European experience. Consequently, and given the paucity of

empirical research on consumer attitudes towards AIS, the importance of the European banking market, and the international impact of PSD2, this paper is timely and is one of the first papers to empirically examine intention to use AIS across multiple European countries.

3. Research Model and Hypotheses

This study draws on UTAUT to develop the framework and hypotheses proposed in Figure 1, with perceived risk modelled as a second order factor.

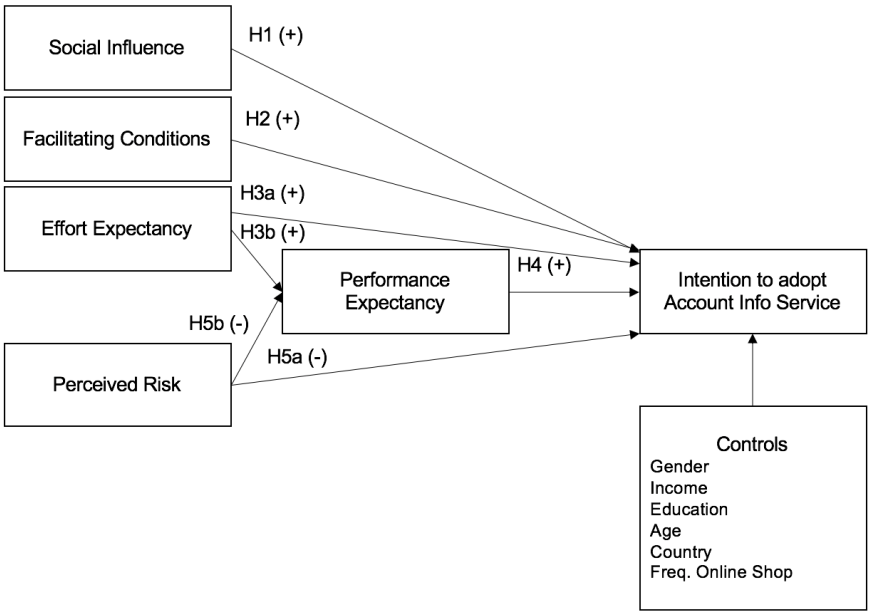


Figure 1. Research model.

Social influence is the degree to which an individual perceives it important that others believe they should use a particular technology [21]; it is represented as subjective norm in TAM2. In its original form, social influence referred to work colleagues or superiors [21], but in a consumer context this may include friends or family [22]. There are mixed findings in relation to the predictive power of social influence in the context of Internet banking, and more recently, mobile banking [23,30]. Indeed, a meta-analysis by [7] suggests that few studies explore social influence as an antecedent of mobile banking attitudes, although it is more prominent in studies relating to intention. Accordingly, we hypothesise:

Hypothesis 1. *Social Influence will have a positive effect on intention to adopt account information services.*

Facilitating conditions was originally a variable in an early user acceptance model; the Model of PC Utilization (MPCU) [35], which bears similarities to perceived behavioural control [21]. As such, it was integrated and adapted in UTAUT(2) [21,22]. It seeks to measure user self-perception of their knowledge, ability, experience, and resources and is theorised as a determinant of technology use [21], while it features as an antecedent in many studies of Internet and mobile banking, results are mixed. For example, Zhou et al. [36] suggest that mobile banking requires consumers to have mobile phone skills and have the financial resources to bear the costs of mobile data services and mobile banking transaction costs, which they categorise as facilitating conditions. In their study of Chinese consumers, they find facilitating conditions, amongst others had significant effects on user adoption, whereas [23] found that the effect of facilitation conditions on usage was not significant. It is important to further clarify the role of facilitating conditions. Given, findings of [32] in relation to the impact of incentives on AIS adoption, we posit:

Hypothesis 2. *Facilitating Conditions will have a positive effect on intention to adopt account information services.*

Perceived ease of use and perceived usefulness are the most commonly used antecedents in mobile banking adoption research for both attitude and intention [7]. In UTAUT2, effort expectancy is a measure of perceived ease of use and its construct and use in UTAUT2 is derived from DOI, TAM, and MPCU [21].

Hypothesis 3a. *Effort Expectancy will have a positive effect on intention to adopt account information services.*

Several TAM studies have explored the relationship between perceived ease of use and perceived usefulness, or effort expectancy and performance expectancy as they are termed in UTAUT. For instance, in [24], perceived ease of use had a significant and positive influence on perceived usefulness but not on intention to adopt e-services. In the mobile banking context, perceived ease of use positively influenced perceived usefulness among young consumers in Germany [37]. Similarly, in UTAUT studies in the mobile banking context, effort expectancy has been shown to positively influence performance expectancy [36]. Interestingly, in both mobile banking studies, performance expectancy was the strongest predictor of intentions towards mobile banking, but effort expectancy did not significantly influence adoption intentions.

Hypothesis 3b. *Effort Expectancy will have a positive effect on Performance Expectancy.*

Performance expectancy is defined as the extent to which using a technology, in this case AIS, will provide benefits to consumers in performing certain activities. It is a measure of perceived usefulness and is a common construct in nearly all technology acceptance models [22]. Clearly in the case of AIS, Bijlsma et al. [32] point to a specific benefit for using AIS—a financial incentive in the context of a loan or mortgage. Given its strength as a predictor in technology generally, and Internet and mobile banking specifically, and the findings of [32], we posit:

Hypothesis 4. *Performance Expectancy will have a positive effect on intention to adopt account information services.*

As discussed above, perceived risk has been identified as a barrier to Internet and mobile banking adoption and usage [23–29]. In particular privacy and security risks are a common theme in extant publications on PSD2 and AIS, although they lack empirical evidence (see, for example, [38,39]. Recent research, once more from the Netherlands, suggests that consumer attitudes towards bank data usage is contingent on the purpose for which it is used [40]. Again, Bijlsma et al. [32] is instructive. They find that the propensity to use AIS is driven by trust in the providers of the services, they perceive the risk in using their own bank as lesser than than the risk associated with BigTech firms [32]. As such, we explore:

Hypothesis 5a. *Perceived Risk will have a negative effect on intention to adopt account information services.*

Martins et al. [23] found that performance, financial, time, and privacy risks were the most salient for perceived risk and negatively influenced performance expectancy. Following this, it can be hypothesised:

Hypothesis 5b. *Perceived Risk will have a negative effect on Performance Expectancy.*

In line with extent technology innovation acceptance and behavioural intention models, we include age, gender, and income as control variables [22,41], while early studies report that older consumers are less likely to adopt Internet and mobile banking [42], more recent research on internet and mobile banking suggests that gender and age are significant predictors of Internet and mobile banking adoption and rejection decisions [43]. Similarly, Martins et al. [23] find that age is a significant predictor of Internet banking use, i.e., older consumers are more likely to adopt and use Internet banking. We also include in our model education level, as this tends to be positively associated with the propensity to adopt a new technology [44], and country fixed effects to control for potential structural differences among different countries [45]. Finally, we control for frequency of online shopping as one of the objectives of PSD2 is to promote the further development of electronic commerce and this represents a proxy of relevant technology experience [46].

4. Methodology and Data Collection

All measurement items in the survey were taken from previous studies in the technology adoption literature [14,21,23,24]. Responses were collected using an online panel provided by Qualtrics with age, gender, income, and country quotas to ensure the sample did not only represent specific cohorts of the population. Qualtrics panels are gathered through an international network of partners that meet accepted industry standards including ICC/ESOMAR (https://esomar.org/, accessed on 29 March 2022) International Code on Market, Opinion and Social Research, and Data Analytics. Quality checks such as time to completion and response completeness were implemented throughout the data collection to make sure respondents did not complete the survey too fast, which may suggest lack of attention, and completed it in full. The average response time was 7 min and 59 s. All the items in the model were measured using a five-point Likert scale (*Strongly Disagree* to *Strongly Agree*) while frequency of online shopping was measured using a frequency scale ranging from *Never* to *Very Often*. A detailed list of items for each construct is provided in Appendix A.

A total of 310 complete responses were received. Data cleaning procedures focused on determining the engagement of each respondent. For data screening purposes, the standard deviation of each response across all latent variables was assessed to identify potential unengaged respondents. Responses with a standard deviation below 1 across all latent variables were manually checked to determine if the respondents were engaged or unengaged. After the removal of unengaged respondents, the final sample size was 244. To reduce the potential effects of common method bias (CMB), procedural remedies were applied during survey design including psychologically separating endogenous and exogenous variables, offering descriptions of new technologies, ensuring all items were unambiguous, notifying respondents there was no correct answer, varying scale anchors and guaranteeing the anonymity of participants [47].

Of the final sample, 61.9% were male and 38.1% were female. The gender gap was mostly due to the data cleaning process as many female respondents were classified as unengaged according to the filters outlined above. The age of participants was as follows; 18–24 years (4.5%), 25–34 (19.7%), 34–44 (23.4%), 45–54 (16.4%), 55–64 (20.9%), and 65+ (15.2%). In terms of highest level of education completed, 3.3% had partially completed second level education, and 19.7% had fully completed second level. A further 36.9% had a Bachelor degree, 33.6% had a Postgraduate qualification, and 6.6% had a PhD. Participants were based in France (14.3%), Germany (15.2%), Ireland (18%), Netherlands (17.6%), Spain (16.4%), and the UK (18.4%), therefore covering countries whose financial systems have different levels of sophistication [48]. In terms of income, 27.5% had a gross annual income below EUR 30,000 (or equivalent), 25.8% earned between EUR 30,000–EUR 59,000 (or equivalent), a further 27.5% earned between EUR 60,000 and EUR 79,000 (or equivalent) and the remaining 19.3% earned EUR 80,000 (or equivalent) and above.

5. Results

5.1. Measurement Model

The proposed factor structure was explored using Confirmatory Factor Analysis (CFA) in AMOS. Perceived risk was modelled as a second order factor with psychological risk, financial risk, time risk, social risk, privacy risk, performance risk, and overall risk serving as first order factors. The model also included performance expectancy, effort expectancy, social influence, and facilitating conditions and intention to adopt account information services. The first order risk factors all loaded well onto the second-order perceived risk factor (std. Rwg: psychological risk: 0.753, financial risk: 0.825, performance risk: 0.916, time risk: 0.885, privacy risk: 0.730, social risk: 0.690, overall risk: 0.808). The model demonstrated acceptable fit in line with the thresholds (CFI: >0.900, CMIN/DF: <3, RMSEA: <0.08, outlined by [49]. The model fit statistics were as follows: CFI: 0.901, CMIN/DF: 2.034 RMSEA: 0.065. The factor loadings for all items was acceptable as shown below in Table 1.

Table 1. Factor loadings for the measurement model.

Constructs	Items	Std. Rwg
Perceived Risk (2nd order factor based on Feathermann and Pavlou, 2003)	**Psychological Risk**	0.753
	PsyRisk1	0.828
	PsyRisk2	0.911
	Financial Risk	0.825
	FinRisk1	0.853
	FinRisk2	0.748
	Privacy Risk	0.730
	PrivRisk1	0.794
	PrivRisk2	0.800
	PrivRisk3	0.771
	PrivRisk4	0.814
	Time Risk	0.885
	TimeRisk1	0.781
	TimeRisk2	0.804
	TimeRisk3	0.756
	TimeRisk4	0.796
	Performance Risk	0.916
	PerRisk1	0.673
	PerRisk2	0.731
	PerRisk3	0.847
	PerRisk4	0.816
	Social Risk	0.690
	SoRisk1	0.963
	SoRisk2	0.877
	Overall Risk	0.808
	ORisk1	0.865
	ORisk2	0.851
	ORisk3	0.854
	ORisk4	0.850
Performance Expectancy (4 items based on Venkatesh et al., 2003)	PE1	0.777
	PE2	0.791
	PE3	0.896
	PE4	0.860
Effort Expectancy (4 items based on Venkatesh et al., 2003)	EE1	0.661
	EE2	0.796
	EE3	0.755
	EE4	0.704

Table 1. *Cont.*

Constructs	Items	Std. Rwg
Social Influence (5 items based on Venkatesh et al., 2003)	SI1	0.783
	SI2	0.788
	SI3	0.881
	SI4	0.893
	SI5	0.856
Facilitating conditions (2 items based on Venkatesh et al., 2003)	FC1	0.784
	FC2	0.742
Intention to Adopt (2 items based on Venkatesh et al., 2003)	INT1	0.942
	INT2	0.910

To test for Common Method bias (CMB), the common latent factor (CLF) approach was used (Table 2). A CLF was added to the model and standardized regression weights compared pre- and post-CLF addition. None of the items experienced a change above 0.200 and thus CMB was not an issue. The validity and reliability of all constructs was also examined. Convergent validity was assessed by calculating the average variance extracted (AVE). All constructs achieved convergent validity with AVE scores above 0.50 [50]. Discriminant validity was tested by comparing the square root of the AVE with the inter-construct correlations [49]. All constructs were deemed discriminatingly valid as the square root of AVE was higher as shown by bold values in Table 2. Reliability was assessed by calculating the composite reliability (CR). With CR scores above 0.70, all constructs were reliable [51].

Table 2. Reliability and validity measures of latent variables.

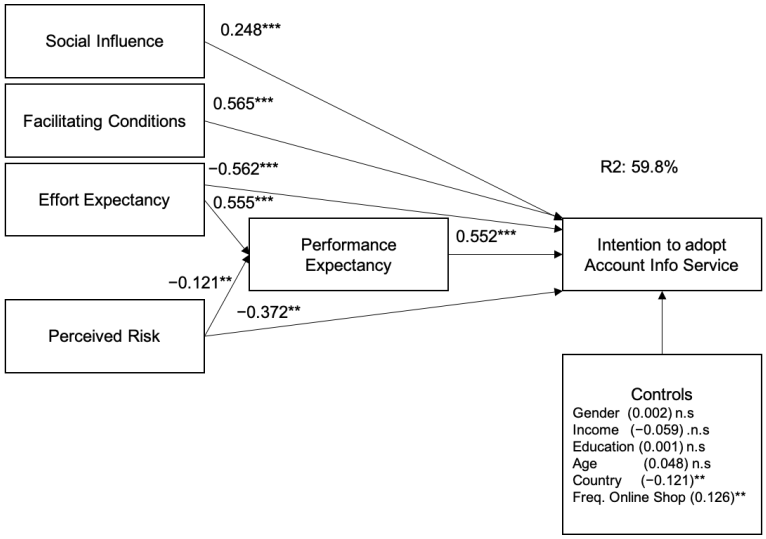
Constructs	CR	AVE	PE	INT	EE	FC	SI	PR
Performance Expectancy (PE)	0.900	0.693	**0.833**					
Intention (INT)	0.923	0.857	0.622 **	**0.926**				
Effort Expectancy (EE)	0.820	0.534	0.612 **	0.427 **	**0.731**			
Facilitating Conditions (FC)	0.736	0.583	0.380 **	0.482 **	0.777 **	**0.764**		
Social Influence (SI)	0.924	0.708	0.713 **	0.487 **	0.298 **	0.223 **	**0.841**	
Perceived Risk (PR)	0.927	0.647	0.009	−0.206 **	−0.287 **	−0.193 **	0.385 **	**0.805**

Note: ** denotes significance at 1 percent level.

5.2. Hypothesis Testing

The data were imputed for analysis using structural equation modelling (SEM) in AMOS v24.0. The model fit for the causal model met required thresholds CFI: 0.963, CMIN/DF: 2.174, RMSEA: 0.069. The results from model one are outlined in Figure 2.

In terms of the UTAUT technology adoption constructs, social influence had a significant, positive influence on intention to adopt account information services (β = 0.248, $p < 0.001$) thus supporting H1. Facilitating conditions also had a significant, positive influence on intention (β = 0.565, $p < 0.001$), supporting H2. Surprisingly, effort expectancy had a negative direct influence on intention to adopt payment initiation services (β = −0.562, $p < 0.001$). Performance expectancy had a positive significant relationship with intention to adopt (β = 0.552, $p < 0.001$), supporting H4. In terms of negative perceptions, perceived risk had a negative influence on adoption intentions as expected (β = −0.372, $p < 0.001$), supporting H5. Facilitating conditions was the strongest predictor of intention, closely followed by performance expectancy.



Note: ** and *** denote significance at 5 and 1 percent level respectively.

Figure 2. Structural model with path coefficients and R-squared.

All control variables were not significant with the exception of country and frequency of online shopping which had a positive influence on intention, meaning more experienced online shoppers were more likely to adopt account information services. Perceived risk also had a negative relationship with performance expectancy ($\beta = -0.121$, $p < 0.001$), and effort expectancy had a positive relationship with performance expectancy ($\beta = 0.555$, $p < 0.001$).

Post hoc mediation testing was conducted to explore the indirect effects of effort expectancy and perceived risk through their relationships with performance expectancy. To test for mediation, bootstrapping with 2000 samples was performed. Perceived risk had a negative indirect effect on intention to adopt via performance expectancy. This is referred to as complementary mediation, where the indirect effect reinforces the direct effect [52]. Effort expectancy had a positive indirect influence on intention via performance expectancy ($\beta = 0.306$, $p < 0.001$). This supports competitive mediation, where the direct relationship between effort expectancy and intention was negative but the indirect influence was positive [52]. The model explained 71% of variance in performance expectancy and 59.8% of variance in intention to adopt account information services among this sample.

6. Discussion and Conclusions

This paper presents the results of one of the first international studies of the determinants of consumer acceptance of account information services under PSD2. The objective of the study is to identify factors which might drive or inhibit European consumer acceptance and adoption of AIS. As such, it makes a timely contribution to both scholarly research and practice at a nascent stage of a major regulatory innovation in banking.

From a theoretical perspective, our results suggest that perceived risk negatively affects the intention to adopt AIS and increases the power of the UTAUT model. This is in line with the findings of Martins et al. [23] who adopted a similar model to investigate the determinants of internet banking adoption and thus, provides supporting evidence regarding the utility of extending UTAUT with perceived risk variables. The results reported in Figure 2 show that all our original hypotheses are confirmed except for the one concerning the direct relationship between Effort Expectancy and intention to adopt AIS (H3a). Previous studies provide mixed results about such a relationship. Zhou et al. [36], for example, found no significant direct relationship between Effort Expectancy and user adoption of mobile banking. However, they also found a positive relationship between Effort Expectancy and intention to adopt when this is mediated by performance expectancy. This positive mediated relationship seems to suggest that users may only view AIS applications as useful if they believe they can use them with little effort. This does not contradict [32],

which suggests that financial incentives may overcome related resistance, and is worthy of further study.

From our control variables we note that Frequency of Online Shopping and Country were both significant control variables. The former is expected and is in line with other studies, while the latter suggests that policymakers cannot assume that all EU Member States are homogeneous and will behave in a similar fashion thus requiring regional or even local strategies to promote adoption. Previous studies have explored the cultural impact on online and mobile banking adoption and customer satisfaction [31,53]. This topic may prove to be a fruitful area for more detailed exploration.

The findings of this study have also some important managerial implications given the early stage of adoption of AIS applications. Our results suggest that perceived risk significantly affects end user intention to adopt an AIS application or not. This is not unexpected given the sensitivity of the data being shared. As such, security is even more critical in the context of AIS than more traditional Internet banking services. Managers should find ways to communicate to potential users that state-of-the-art security solutions are implemented and to mitigate perceived risk. The role of peers, friends and family, should not be underestimated, however given the findings of Bijlsma et al. [32], neither should incentives. Early adoption is more likely to be found with those who are more active in online shopping. The COVID-19 pandemic has accelerated e-commerce and given the potential role of social influence, targeting and incentivising high-frequency online shoppers with large social networks may prove to be an effective strategy for encouraging adoption. The findings relating to effort expectancy require further research and consideration by industry and policymakers. This could be a trust issue with the Internet and banking, or could be related to financial or digital literacy, or lack thereof. In the former case, the findings of [54] on the role of post-use trust in the acceptance of technology at the firm level might be usefully adapted to the individual case. In the latter case, insights from [55] in respect of FinTech solution adoption could open the door for further research. Clearly, communicating the benefits and ease of use of AIS is critical. Finally, firms should be cognisant of the country differences and avoid one-solution-fits-all approaches.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Survey items.

Constructs	Items	Questions
Perceived Risk	PsyRisk1	I think that account information services will not fit in well with my self-image or self-concept.
	PsyRisk2	If I use an account information service, it will negatively affect the way others think of me.
	FinRisk1	The chances of losing money if I use an account information service are high.
	FinRisk2	My signing up for and using an account information service would lead to a financial loss for me.
	PrivRisk1	The chances of using an account information service and losing control over the privacy of my payment information is high.
	PrivRisk2	My signing up and using of an account information service would lead me to a loss of privacy because my personal information may be used without my knowledge.
	PrivRisk3	Internet hackers (criminals) might take control of my bank account(s) if I use an account information service.
	PrivRisk4	On the whole, considering all sorts of factors combined, it would be risky if I use an account information service.
	TimeRisk1	I think that if I use an account information service then I will lose time due to having to switch to a different payment method.
	TimeRisk2	Using an account information service would lead to a loss of convenience for me because I would have to waste a lot of time fixing payments/information errors.
	TimeRisk3	Considering the investment of my time involved to set up an account information service, it would be risky.
	TimeRisk4	The possible time loss from having to set up and learn how to use an account information service is high.
	PerRisk1	Account information services might not perform well and create problems with my credit.
	PerRisk2	The security systems built into the account information services are not strong enough to protect my account.
	PerRisk3	The probability that something's wrong with the performance of account information services is high.
	PerRisk4	Considering the expected level of performance of account information services, for me to sign up and use, it would be risky.
	SoRisk1	If I use an account information service, it will negatively affect the way others think of me.
	SoRisk2	My signing up for and using an account information service would lead to a social loss for me because my friends and relatives would think less highly of me.
	ORisk1	On the whole, considering all sorts of factors combined, it would be risky if I use an account information service.
	ORisk2	Using an account information service to control my financial information would be risky.
	ORisk3	Account information services would be dangerous to use.
	ORisk4	Using an account information service exposes me to an overall risk.

Table A1. *Cont.*

Constructs	Items	Questions
Performance Expectancy	PE1	An account information service is useful to carry out my tasks.
	PE2	I think that using an account information service would enable me to conduct tasks more quickly.
	PE3	I think that using an account information service would increase my productivity.
	PE4	I think that using an account information service would improve my performance.
Effort Expectancy	EE1	My interaction with an account information service would be clear and understandable.
	EE2	It would be easy for me to become skilful at using an account information service.
	EE3	I would find account information services easy to use.
	EE4	I think that learning to use an account information service would be easy for me.
Social Influence	SI1	People who influence my behaviour would think that I should use an account information service.
	SI2	People who are important to me would think that I should use an account information service.
	SI3	People in my environment who use an account information service would have more prestige than those who do not.
	SI4	People in my environment who would use an account information service have a high profile.
	SI5	Using an account information service would be a status symbol in my environment.
Facilitating Conditions	FC1	I have the resources necessary to use an account information service.
	FC2	I have the knowledge necessary to use an account information service.
Intention to Adopt	INT1	Assuming I had access to an account information service, I would intend to use it.
	INT2	Given that I had access to an account information service, I predict that I would use it.

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