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The role of acquaintances' characteristics in shaping digital payment technology

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ABSTRACT

This study examines how acquaintances (friends, family, and close associates) characteristics (education, employment status, and income) shape the intensity of digital payment technology (PayTech) usage. Using data from The Netherlands and a Seemingly Unrelated Regression Equation model, the results reveal that higher education, employment, and income among acquaintances significantly influence individuals' usage intensity of peer-to-peer (*P2P*), contactless, and mobile payment systems. *P2P* payments are particularly impacted (potentially because of their social orientation) with higher education and income among acquaintances encouraging their use. These findings reflect the essential influence of social networks on driving PayTech usage intensity.

1. Introduction

The rapid evolution of digital financial technologies has transformed payment systems and this has been driven by technological advancements and shifting consumer preferences. Digital payment methods, such as peer-to-peer (*P2P*), contactless, and mobile payments, witnessed substantial growth during the COVID-19 pandemic due to health risks associated with physical payments (Tut, 2023). Digital payment technology (PayTech) is a branch of financial technology (FinTech) that specializes in payment processing and financial transactions. It is a rapidly expanding area of FinTech services from a consumer perspective. The expansion of the PayTech sector has been phenomenal in Europe, and is partially due to the result of the implementation of the Revised Payment Services Directive 2 (PSD2), which took effect across all European Union member states in 2018 and encouraged technological business model innovations for initiating payment transactions.

The COVID-19 pandemic and its associated lockdowns, social distancing measures, and heightened health concerns significantly impacted consumer behavior and accelerated the transition to digital financial solutions (Tut, 2023). *P2P* payment systems (proxied in this study by *Tikkie*[1]) experienced a surge in usage as people sought convenient ways to share costs, repay debts, and manage social

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[1] *Tikkie* is a digital payment application in the Netherlands that enables users to send payment requests directly to others through messaging platforms like WhatsApp, making it easy to settle personal transactions. The app also allows payments via QR code, offering a fast and convenient way for individuals or businesses to receive payments without the need for complex bank transfers. *Tikkie* is designed to simplify *P2P* transactions such as splitting bills or reimbursing friends by leveraging popular communication channels and intuitive technology, making financial exchanges seamless and accessible.

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transactions without physical contact (Irimia-Diéguez et al., 2023). Similarly, contactless payments (proxied in this study by *Apple Pay*[2]), where a mobile app is used for contactless exchange became increasingly prevalent as consumers preferred touch-free transactions to minimize the risk of virus transmission (Sreelakshmi and Prathap, 2023). Mobile payments encompass a wide range of financial services accessed through smartphones, and also experienced significant growth during the pandemic, resulting in the need for remote payment services (Adbi and Natarajan, 2023).

Despite extensive research on digital payment adoption, critical gaps remain. First, most studies have focused on users' adoption of digital payment methods (e.g., Sahi et al., 2021), often overlooking the intensity of usage (how frequently and extensively individuals use these methods). Understanding usage intensity is essential for providing richer insights into users' payment practices beyond initial adoption. Second, previous research has predominantly emphasized individual factors such as gender, age, and financial literacy (e.g., Karjaluoto et al., 2020), with no exploration of social network effects. Third, digital payment studies have often treated different payment methods in isolation, neglecting the interconnected nature of usage patterns. Individuals frequently use multiple payment methods concurrently, resulting in correlated practices. We analyze usage intensity across multiple payment methods while accounting for correlated errors in outcomes, providing a holistic view of payment usage behavior.

Acquaintances, defined here as family members and friends, have a vital influence on shaping individual behaviors through social influence and information sharing. Their characteristics (education level, income level, and employment status) can significantly impact an individual's financial decisions and behaviors (Cannon et al., 2024). The diffusion of innovations theory (Rogers, 2003) explains how new technologies spread through social systems, suggesting that social networks and the characteristics of early adopters influence others' adoption of innovations. In theory, early adopters are more deeply embedded within the social system. They are typically better informed about new innovations, more familiar with emerging technologies, and often enjoy greater economic success (Rogers, 2003). Individuals are more likely to adopt new payment methods if they observe their acquaintances—particularly those with higher status or credibility—adopting and endorsing these technologies. The theory highlights how the adoption behavior of key individuals within a network can accelerate the diffusion of innovations through social influence and peer effects. Therefore, we examine whether acquaintances' characteristics are significantly associated with the usage intensity of different PayTech methods.

The remainder of this paper proceeds as follows. Section 2 outlines the methods and data used, Section 3 presents the results, and Section 4 concludes.

2. Data and methods

2.1. Data

We use the De Nederlandsche Bank Household Survey (DHS) panel data. The survey is conducted annually in The Netherlands and collects data from households representing the Dutch population. The questionnaire covers various topics such as general household information, assets and liabilities, and economic and psychological factors. Our analysis sample includes five waves of data between 2019 and 2023. The starting date reflects the availability of our dependent variables while the ending date reflects the latest survey collected to date. The dataset contains 2510 unique individuals and 10,735 individual–year observations. The DHS is appropriate for this study as it includes several questions about acquaintances' characteristics.

2.2. Variables[3]

2.2.1. Dependent variables

We use three dependent variables. Contactless payments (*CPAY*), peer-to-peer[4] payments (*P2P*), and mobile payments (*MPAY*) to examine the intensity of usage. Respondents indicated the frequency with which they used these payment technologies, choosing from a range of 1 to 5, reflecting a natural ranking from least (1) to most frequent (5) usage. Each successive response option (1–5) represents an increase in the frequency of use, but the exact difference between the categories is not necessarily equal or quantifiable.

2.2.2. Independent variables[5]

The main independent variables of the study reflect the characteristics of the respondents' circle of acquaintances, referring to people a respondent associates frequently with such as friends, family, neighbors, or people at work. We specifically use three variables to reflect the typical characteristics of respondents' acquaintances, encompassing education (*Acq_education*), income (*Acq_income*), and employment status (*Acq_employment*). The study also controls for several individual level variables that have been empirically associated with PayTech usage intensity and adoption, including age (*Age*), employment status (*Employment*), education (*Education*), risk tolerance (*Risk tolerance*), and self-reported financial knowledge (*Financial knowledge*).

[2] Apple Pay is a mobile payment and digital wallet service by Apple that allows users to make secure payments in stores, apps, and online using Apple devices such as iPhones, iPads, Apple Watches, or Mac computers. The service uses near-field communication technology for contactless payments at physical locations and supports in-app and online purchases.

[3] A detailed explanation of the variables is included in the Supplementary Materials.

[4] This is proxied by *Tikkie* as previously explained.

[5] We tested for multicollinearity, and the results (not reported for brevity) show that the variance inflation factors ruled out collinearity among the variables.

2.3. Empirical model

The factors influencing an individual's usage intensity with one payment technology may also impact their intensity with other types of technologies. Therefore, while usage intensity for each technology may appear to be independent and the parameters may seem separately estimable (one equation at a time), it is likely that the error terms of these models are correlated. As a result, we use a system of simultaneous equations—Seemingly Unrelated Regression equation (SURE) model —to analyze the impact of acquaintances' characteristics on the usage intensity of different payment technologies. This approach enables the joint estimation of multiple regression models if the error terms related to the dependent variables correlate across the equations. Estimating the system simultaneously while considering the complete covariance structure of the error terms tends to be more efficient. In general, the SURE model is represented as follows:

$$y' = x'\theta + \varepsilon', \tag{1}$$

where y' is a vector of order $(1 \times m)$ representing the m SURE equations, $x' = (x_1, \ldots x_k)'$ is a vector of independent variables, ε' is a vector of error terms of order $(1 \times m)$, and θ is a matrix of coefficients of order $(m \times k)$. We assume that error terms are identically and independently distributed (*i.i.d*) $(\varepsilon'|x \sim i.i.d., N(0,\Sigma)$. From the generic form of the SURE model in Eq. (1), we specify the following set of three simultaneous equations associated with each of the payment methods:

$$P2P_{i1} = \beta_1 AC + \lambda_1 X_{i1} + \varepsilon_{i1} \tag{2}$$

$$Cpay_{i2} = \beta_2 AC + \lambda_2 X_{i2} + \varepsilon_{i2} \tag{3}$$

$$Mpay_{i3} = \beta_3 AC + \lambda_3 X_{i3} + \varepsilon_{i1}, \tag{4}$$

where *P2P, CPAY*, and *MPAY* represent the three payment technologies used in this study, *AC* represents the vector of acquaintance characteristics, *X* represents the vector of control variables, and β_m and λ_m are parameters of the m^{th} equation to be estimated. We estimate the SURE system using the conditional mixed process model (Roodman, 2011), which is versatile and well-suited for modeling SURE equations when some or all of the outcome variables are not continuous. Since all our outcome variables are ordinal, we use ordered probit regressions for each equation in the SURE model.

3. Results

In Table 1, *atanhrho* and *rho* (ρ) explain the relationships between the error terms across the equations for each payment method. *atanhrho* is the inverse hyperbolic tangent transformation of the correlation coefficients, ensuring that the estimated correlations remain between − 1 and 1. For instance, in Table 1 the value */atanhrho_12 = 0.4511* indicates a positive correlation between the unobserved factors affecting *P2P* (first outcome) and *CPAY* (second outcome). This suggests that the factors driving usage intensity with one payment method will likely influence the other. This indicates that common unobserved factors tend to drive the likelihood of adopting both payment methods in the same direction. Therefore, modeling the relationships as a system of equations provides more efficient parameters than single equations because of the significant correlated errors (Roodman, 2011).

Concerning the empirical results, Table 1 shows that acquaintance characteristics (education, employment status, and income) have distinct roles in influencing the usage intensity of various payment methods. Starting with *Acq_education*, Table 1 shows that individuals with more educated acquaintances are significantly more likely to have higher usage intensity of *P2P* and *MPAY*. This suggests that educated peers are not only familiar with digital financial solutions but could also be early adopters, signaling to others within their network the reliability and convenience of using such platforms for social financial transactions like splitting bills (Tariq et al., 2024). This finding aligns with the broader assumption that higher education correlates with greater technology awareness and usage capabilities (Jiang et al., 2021). However, the impact of acquaintances' education on CPAY is insignificant, indicating that simpler payment methods may not require the social proof provided by well-educated peers.

Individuals with employed acquaintances have a significantly higher probability of increased *P2P* usage intensity. This is likely because employed acquaintances are more financially stable and engage more frequently in social transactions. Employment brings financial stability, making digital tools like *Tikkie* more practical for managing day-to-day financial interactions such as splitting bills or reimbursing friends. In contrast, employment status has no significant impact on CPAY, which are more routine and less dependent on the financial or social habits of one's peers. Acquaintances' income has a significant influence on driving the usage intensity of all payment methods. Higher-income acquaintances are more likely to encourage using these platforms as wealthier social networks generally have greater exposure to digital financial services and the financial means to adopt new technologies. In social settings where financial exchanges between friends or colleagues are frequent, *P2P* payment methods like *Tikkie* become more normalized. Similarly, CPAY and MPAY are more prevalent in affluent networks, where access to smartphones, bank accounts, and digital payment options is more common.

Regarding the individual level control variables in Table 1, employed individuals demonstrate a strong inclination toward increasingly using these payment methods, particularly *P2P* and *CPAY*. Gender differences are also evident, with females showing less usage intensity for *CPAY* and more usage intensity for *P2P* while no significant difference for *MPAY*. This highlights the influence of gender on payment method usage (Chen et al., 2023). Age consistently has a negative relationship with the usage intensity of all payment methods, supporting studies demonstrating that older individuals are generally less inclined to increasingly use these

Table 1
Results from the SURE model.

	P2P		*CPAY*		*MPAY*	
	Coef.	Std.Err	Coef.	Std.Err	Coef.	Std.Err
Acq_education						
Tertiary	0.1297**	0.0522	0.0508	0.0666	0.1286**	0.0528
Acq_employment						
Employed	0.2194***	0.0645	0.0600	0.0881	0.0403	0.0633
Acq_income						
22,000–40,000	0.1583**	0.0715	0.0351	0.0944	0.1933***	0.0722
>40,000	0.4531***	0.0787	0.2820***	0.0987	0.4898***	0.0817
Employment						
Employed	0.1857**	0.0896	0.2796**	0.1095	0.0813	0.1021
Retired	0.0425	0.1026	0.1543	0.1324	0.1563	0.1035
Gender						
Female	0.2256***	0.0501	−0.2901***	0.0677	−0.0087	0.0596
Age	−1.9424***	0.1115	−1.1099***	0.1297	−1.8272***	0.1453
Risk tolerance						
Moderate	0.0226	0.0516	−0.1423**	0.0667	0.0388	0.0655
High	−0.2556***	0.0435	−0.3345***	0.0569	−0.1274***	0.0485
Education						
Tertiary Education	0.0481	0.0646	−0.1817**	0.0839	0.0544	0.086
Financial knowledge						
More knowledgeable	0.3754***	0.0674	0.1984*	0.1135	0.3171***	0.0755
/atanhrho_12	0.4511***	0.0311				
/atanhrho_13	0.7983***	0.0293				
/atanhrho_23	0.4764***	0.0372				
rho_12	0.4228***	0.0255				
rho_13	0.6631***	0.0164				
rho_23	0.4434***	0.0299				

Notes: *P2P, CPAY,* and *MPAY* represent the outcome variables of peer-to-peer, contactless, and mobile payments, respectively. Coef. denotes regression coefficient, Std.Err represents robust errors clustered at the individual level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively. The set of simultaneous equations uses ordered probit models.

technologies (Krupa and Buszko, 2023). This trend reflects the significance of targeting younger demographics to promote digital payment solutions.

Individuals with high-risk appetites are less likely to use digital payment methods frequently. This finding challenges the assumption that a higher risk appetite will always translate into increased adoption of FinTech-based payment solutions (Ali et al., 2021). Concerning financial knowledge, more knowledgeable individuals demonstrate significantly higher usage rates for all payment types, indicating that enhancing financial knowledge could be key to increasing the use of digital payment methods.

The influence of acquaintances' characteristics on PayTech usage intensity, particularly with socially driven payment methods such as *Tikkie*, can be effectively explained through the lens of the diffusion of innovation theory (Rogers, 2003). According to the theory, social systems have a crucial influence on adopting new technologies, and individuals are often influenced by peers and their social environment when deciding to use innovations. In the case of *Tikkie*, which relies heavily on *P2P* interactions, this use is driven by social influence, with educated and employed individuals often acting as early adopters who set the norm for using digital financial solutions. Due to higher social standing and information access, such individuals influence others within their social networks, encouraging wider adoption. As Li et al. (2021) suggested, peer influence is particularly significant for payment methods embedded in social contexts such as *Tikkie*.

4. Conclusion

This study advances the scholarly discourse around digital financial inclusion by demonstrating how social networks, particularly acquaintances' characteristics, influence PayTech usage intensity. The findings reveal the role of social dynamics—acquaintances' education, employment status, and income—in accelerating digital payment usage intensity, particularly *P2P*, and in the process, emphasizing socially driven mechanisms. FinTech companies should leverage these insights by tailoring marketing strategies to social groups with higher education and incomes. Incorporating "social proof" elements such as endorsements or testimonials from well-educated and employed individuals could enhance trust, adoption, and usage intensity. Future studies could investigate whether the impact of acquaintances' characteristics on PayTech usage intensity varies across different cultural or regional contexts. For instance, do collectivist cultures exhibit stronger social dynamics in FinTech usage than individualist cultures? Additionally, future studies could examine potential mediating and moderating factors such as financial literacy, trust in technology, or perceived security.

CRediT authorship contribution statement

Kingstone Nyakurukwa: Writing – original draft, Methodology, Formal analysis, Conceptualization. **Yudhvir Seetharam:**

Writing – review & editing, Writing – original draft, Supervision, Formal analysis, Conceptualization. **Chimwemwe Chipeta:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization.

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Data availability

Data will be made available on request.

References

Adbi, A., Natarajan, S., 2023. Fintech and banks as complements in microentrepreneurship. Strategic Entrepreneurship J. 17 (3), 585–611. https://doi.org/10.1002/sej.1470.

Ali, M., Raza, S.A., Khamis, B., Puah, C.H., Amin, H., 2021. How perceived risk, benefit and trust determine user Fintech adoption: a new dimension for Islamic finance. Foresight 23, 403–420. https://doi.org/10.1108/FS-09-2020-0095.

Cannon, B., Hirshleifer, D., Thornton, J., 2024. Friends With Benefits: Social Capital and Household Financial Behavior. National Bureau of Economic Research. https://doi.org/10.3386/w32186. Working Paper No. 32186.

Chen, S., Doerr, S., Frost, J., Gambacorta, L., Shin, H.S., 2023. The fintech gender gap. J. Financ. Intermed. 54, 101026. https://doi.org/10.1016/j.jfi.2023.101026.

Irimia-Diéguez, A., Liébana-Cabanillas, F., Blanco-Oliver, A., Lara-Rubio, J., 2023. What drives consumers to use P2P payment systems? An analytical approach based on the stimulus–organism–response (S-O-R) model. Eur. J. Manag. Bus. Econ. https://doi.org/10.1108/EJMBE-12-2022-0374 (ahead-of-print).

Jiang, W., Tang, Y., Xiao, R.(Jiqiu), Yao, V., 2021. Surviving the Fintech Disruption. NBER. Working Papers, 28668. https://ideas.repec.org//p/nbr/nberwo/28668.html.

Karjaluoto, H., Shaikh, A.A., Leppäniemi, M., Luomala, R., 2020. Examining consumers' usage intention of contactless payment systems. Int. J. Bank Mark. 38, 332–351. https://doi.org/10.1108/IJBM-04-2019-0155.

Krupa, D., Buszko, M., 2023. Age-dependent differences in using FinTech products and services—Young customers versus other adults. PLOS One 18, e0293470. https://doi.org/10.1371/journal.pone.0293470.

Li, L., Freeman, G., Wohn, D.Y., 2021. The interplay of financial exchanges and offline interpersonal relationships through digital peer-to-peer payments. Telematics Inf. 63, 101671. https://doi.org/10.1016/j.tele.2021.101671.

Rogers, E.M., 2003. Diffusion of Innovations, 5th ed. Free Press.

Roodman, D., 2011. Fitting fully observed recursive mixed-process models with cmp. STATA J. Promoting Commun. Stat. Stata 11, 159–206. https://doi.org/10.1177/1536867X1101100202.

Sahi, A.M., Khalid, H., Abbas, A.F., Khatib, S.F.A., 2021. The evolving research of customer adoption of digital payment: learning from content and statistical analysis of the literature. J. Open Innov. Technol. Mark. Complexity 7, 230. https://doi.org/10.3390/joitmc7040230.

Sreelakshmi, C.C., Prathap, S.K., 2023. Effect of COVID-19 health threat on consumer's perceived value towards mobile payments in India: a means-end model. J. Financ. Serv. Mark. 29, 763–787. https://doi.org/10.1057/s41264-023-00233-9.

Tariq, M., Maryam, S.Z., Shaheen, W.A., 2024. Cognitive factors and actual usage of Fintech innovation: exploring the UTAUT framework for digital banking. Heliyon 10 (15), e35582. https://doi.org/10.1016/j.heliyon.2024.e35582.

Tut, D., 2023. FinTech and the COVID-19 pandemic: evidence from electronic payment systems. Emerg. Mark. Rev. 54, 100999. https://doi.org/10.1016/j.ememar.2023.100999.