

Special Feature C

Privacy, Trust in Banks, and Use of Cash

Ivan Png and Charmaine Tan¹

1 Introduction

In China, street vendors, buskers, and even beggars accept electronic payments (Jenkins, 2018). By contrast, six of ten Tokyo restaurants require payment in cash (Lewis, 2019). Worldwide, the share of retail transactions paid in cash ranges from 11% in Norway (Norges Bank, 2018) to 74% in Germany (Deutsche Bundesbank, 2018).

Cash is costly, and estimated to cost an average of 1.5% of GDP worldwide (Jenkins, 2018), but just 0.5% of GDP in Singapore (Menon, 2016). Moreover, cash facilitates tax evasion, financial crimes, drug smuggling, and terrorism (Rogoff, 2015; Sands *et al.*, 2016). National governments would dearly like to reduce the use of cash. Yet, cash persists.

What accounts for the persistence of cash? Among consumers, not all subscribe to debit or credit cards, or mobile payments (Bagnall *et al.*, 2016; Esselink and Hernandez, 2017). One reason is they may (rationally) worry about spending excessively and rely on payment in cash as a mechanism to control themselves (Bertaut *et al.*, 2009; Von Kalckreuth *et al.*, 2014). Another is that paying with cash is a habit that is slow to change, especially for some segments of the population (Connolly and Stavins, 2015). Among merchants, not all wish to incur the fees associated with electronic payment systems (Boon, 2017). However, some of the costs of cash payments increase with transaction size relatively faster than the costs of electronic payments. Consequently, payment in cash is more frequent for transactions of smaller value (Whitesell, 1989; Chen *et al.*, 2019). Another factor affecting the reliability of electronic payments is infrastructure reliability. In June 2018, one of Visa's data centres broke down and disrupted 5.2 million transactions across Europe for a 10-hour period (Collinson, 2018).

In this study, we carry out an empirical investigation of two psychological factors that affect the use of cash which have been relatively overlooked in prior research. One is privacy. Payments in cash leave little paper trail. Indeed, the Privacy Commissioner of Canada (2018) advised cannabis buyers to pay in cash to avoid detection by governments of other countries. From a theoretical viewpoint, Kahn *et al.* (2005) argue that cash increases social welfare by enabling transactions that might not otherwise take place owing to the risk of sellers misusing buyers' identities.

The other factor is trust in banks. Data on electronic transactions is vulnerable to hacking and theft. Further, custodians of data may use or sell the data for other purposes. Hence, another factor in the use of cash is confidence in financial intermediaries, which is due in part to an underlying concern for privacy. Ms Sarah Friar, Chief Financial Officer of payments

¹ Ivan Png is a Distinguished Professor in the School of Business and Departments of Economics and Information Systems and Analytics (by courtesy) at the National University of Singapore (NUS). Charmaine Tan is a Post-Doctoral Fellow at the NUS School of Business. The authors would like to thank Valerie Chuang for her valuable assistance with this research study. This study was funded by the Ministry of Education, Singapore, grant MOE2016-SSRTG-059, SPIRE. The views in this article are solely those of the authors and should not be attributed to MAS or NUS.

processor Square, has asserted: “We are very careful about what we share...One wrong step and we’d be out of business” (Jenkins, 2018). In addition, consumers are more likely to adopt electronic payment methods when there is a lower risk of bank default. Prior research has found that trust in banks affects depositor behaviour (Osili and Paulson, 2014) and cash holdings (Jobst and Stix, 2017).

Our study combines data from various sources. Data on the use of cash in retail transactions among 36 countries between 2010 and 2017 was constructed from central bank reports and other secondary sources. Data on concern for privacy and trust in banks was derived from the World Values Survey and the World Economic Forum.

In cross-sectional regression estimates, the use of cash in retail transactions increased with concern for privacy and decreased with trust in banks. Specifically, an increase in concern for privacy by one standard deviation (equivalent to an increase from the level in France to that in Korea) is associated with an increase in cash usage of 9.8% points. Further, an increase in trust in banks by one standard deviation (equivalent to an increase from the level in the United States to that in Finland) is associated with a reduction in cash usage of 12.3% points. These estimates are substantial relative to the mean of 70.2%.

Overall, our empirical results are consistent with concern for privacy and mistrust of financial institutions leading individuals to avoid electronic payments in favour of cash. These findings help to explain the persistence in the use of cash particularly in countries where people are concerned about privacy or lack confidence in financial institutions.

2 Data

We compiled a dataset of 36 countries from three main sources. Data on the proportion of the number of retail transactions paid in cash was drawn from central bank reports and other sources.² The central bank studies disclose their methodologies, which are mostly based on payment diaries kept by representative samples of consumers. By contrast, most other sources did not disclose their methodology or primary sources, and so, seem less reliable. Accordingly, wherever available, central bank data was preferred. **Table 1** reports the retail cash usage by country.

We drew measures of concern about privacy and trust in banks from the 2010–14 wave of the World Values Survey (Inglehart *et al.*, 2014) and the World Economic Forum’s Global Shapers Annual Survey 2017 (World Economic Forum, 2018). The World Values Survey is a nationally representative study of changes in the beliefs, values and motivations of people throughout the world. The Global Shapers Survey focuses on young people, aged between 18 and 35, and seeks to understand their perceptions of global issues and trends. If both sources were available, we preferred the Global Shapers Survey as it covered more countries. Data from the Global Shapers Survey for countries with fewer than 20 respondents was excluded. To make data from the two surveys comparable, the raw survey measures were standardised to zero mean and unit standard deviation.

² Data on the proportion of the total value of retail transactions paid by cash was available for only a subset of countries in the sample. Cash share by the number of transactions is generally higher than cash share by transaction value, since cash is used more frequently for small-value transactions.

Table 1 Cash usage

Country	Year	Average Cash Share of Retail Transactions (%)	Source	Central Bank
Austria	2016	81.8	Rusu and Stix (2017)	Oesterreichische Nationalbank
Australia	2016	37	Doyle <i>et al.</i> (2017)	Reserve Bank of Australia
Belgium	2016	63	Esselink and Hernandez (2017)	European Central Bank
Brazil	2011	89	Denecker <i>et al.</i> (2013)	-
Switzerland	2017	70	Swiss National Bank (2017)	Swiss National Bank
China	2010	98	McKinsey Global Payments Map	-
Cyprus	2016	88	Esselink and Hernandez (2017)	European Central Bank
Germany	2016–17	75.1	Deutsche Bundesbank (2018)	Deutsche Bundesbank
Estonia	2011–13	37	Kantar Emor, Turu-uuringute AS	-
Spain	2016	87	Esselink and Hernandez (2017)	European Central Bank
Finland	2016	54	Esselink and Hernandez (2017)	European Central Bank
France	2016	68	Esselink and Hernandez (2017)	European Central Bank
Greece	2016	88	Esselink and Hernandez (2017)	European Central Bank
Hong Kong SAR	2010	55.1	McKinsey Global Payments Map	-
Ireland	2016	79	Esselink and Hernandez (2017)	European Central Bank
India	2010	99.7	McKinsey Global Payments Map	-
Italy	2016	86	Esselink and Hernandez (2017)	European Central Bank
Japan	2010	77	Vinayak <i>et al.</i> (2012)	-
Korea	2010–14	51.9	Bank of Korea Payments Report (2014); Vinayak <i>et al.</i> (2012)	Bank of Korea -
Luxembourg	2016	64	Esselink and Hernandez (2017)	European Central Bank
Mexico	2011	96	Denecker <i>et al.</i> (2013)	-
Malaysia	2010	92.5	McKinsey Global Payments Map	-
Nigeria	2011	~100	Denecker <i>et al.</i> (2013)	-
Netherlands	2016	45	Esselink and Hernandez (2017)	European Central Bank
Norway	2017	11.9	Norges Bank (2018)	Norges Bank
Poland	2016	63	Narodowy Bank Polski (2018)	Narodowy Bank Polski

Portugal	2016	81	Esselink and Hernandez (2017)	European Central Bank
Russia	2011	95	Denecker <i>et al.</i> (2013)	-
South Africa	2011	92	Denecker <i>et al.</i> (2013)	-
Sweden	2016–17	14	Sveriges Riksbank (2018)	Sveriges Riksbank
Singapore	2015	60	KPMG (2016)	-
Thailand	2010	97.1	McKinsey Global Payments Map	-
Tunisia	2011	99	Denecker <i>et al.</i> (2013)	-
Taiwan	2010–13	70.9	Ministry of Economic Affairs, R.O.C.; McKinsey Global Payments Map	Ministry of Economic Affairs, R.O.C.
United Kingdom	2017	34	UK Finance (2018)	-
United States	2016	27.1	Greene and Staviv (2018)	Federal Reserve Bank of Boston

Table 2 reports summary statistics of the combined dataset. For 21 countries, data on privacy and trust in banks from the Global Shapers Survey was merged with data on average cash usage in 2016–17. For the other 15 countries, we drew on the World Values Survey, and merged the data with that on average cash usage in 2010–14. On average across the countries in our sample, 70.2% of retail transactions were paid in cash.³ The means of the measures of privacy concern and trust in banks are naturally close to zero owing to standardisation. Evidently, across countries, there was considerable variation in usage of cash, privacy concern, and trust in banks. Data on GDP per capita and on Internet users was drawn from the World Development Indicators. Internet users is the number of people (per 100) who had used the Internet in the previous three months via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.

Table 2 Summary statistics

Variables	Unit	Observations	Mean	Standard Deviation	Min	Max
Cash usage	Per cent	36	70.2	25.0	11.9	100
GDP per capita	US\$ (Thousand)	36	33.8	24.6	1.35	101
Internet users	% of population	35	68.8	24.9	7.5	98.1
Global Shapers Survey dummy		36	0.583	0.500	0	1
Privacy concern		36	0.178	0.964	-1.64	2.28
Trust in banks		36	0.170	0.937	-1.12	2.50

³ Among the 21 countries matched with the Global Shapers Survey, the average share of retail transactions paid in cash was 60.9% in 2016–17. For the other 15 countries, average cash usage in 2010–14 was 83.3%.

3 Results

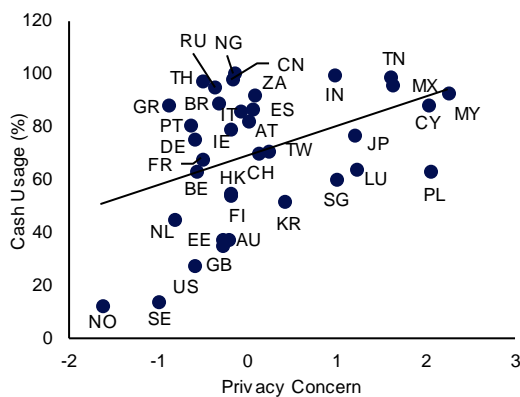
For a preliminary look at the data, **Chart 1a** graphs the cash share of retail transactions against concern for privacy. The upward-sloping regression line suggests that use of cash increased with concern for privacy. Further, **Chart 1b** graphs the cash share of retail transactions against confidence in banks. The downward-sloping regression line suggests that use of cash decreased with confidence in banks.

While suggestive, **Charts 1a** and **1b** do not take account of other factors that might possibly affect the relationship between usage of cash and concern for privacy and trust in banks. Accordingly, we turn to multiple regression analyses.

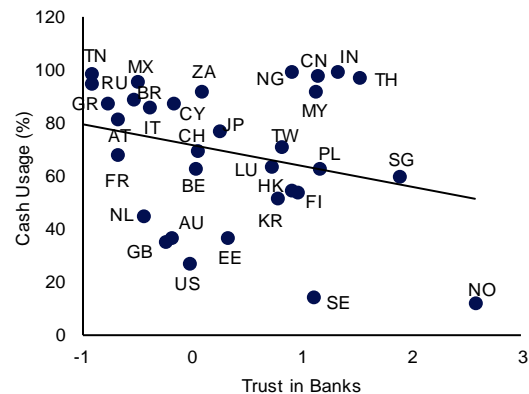
Table 3 reports ordinary least squares regression estimates of the cash share of retail transactions, with robust standard errors in parentheses. Column (1) reports an estimate of a baseline specification with GDP per capita as the only explanatory variable. The coefficient of GDP per capita is negative and significant. This result is consistent with cash usage decreasing with subscription to debit and credit cards, smartphones and payment infrastructure, all of which increase with income.

Chart 1 Cash, privacy, and trust in banks

a. Privacy concern



b. Trust in banks



Note: Privacy concern from the Global Shapers Survey is based on the proportion of respondents who chose privacy as one of the “most serious issues facing the world today”. Privacy concern from the World Values Survey is measured by the responses to the question “To what degree are you worried about government wire-tapping or reading my mail or email?” Trust in banks from the Global Shapers Survey is based on the proportion of respondents who agree that they trust banks to be fair and honest. Trust in banks from the World Values Survey is measured by the responses to the question “How much confidence do you have in banks?”

Table 3 Regression estimates of the cash share of retail transactions

Dependent Variable: Cash Share of Retail Transactions	Specification					
	Baseline (1)	Privacy Concern (2)	Trust in Banks (3)	Privacy and Trust in Banks (4)	Internet Users (5)	Central Bank Studies (6)
GDP per capita	-0.553*** (0.174)	-0.387** (0.183)	-0.364** (0.169)	-0.308** (0.151)	0.139 (0.097)	0.308** (0.142)
Privacy concern		7.184** (3.498)		7.852*** (2.890)	8.542*** (2.110)	9.829*** (2.417)
Global Shapers Survey dummy		-7.592 (9.437)	-15.684** (7.002)	-13.490* (7.175)	7.435 (5.116)	10.641** (5.009)
Trust in banks			-9.658*** (2.959)	-10.153*** (2.791)	-10.413*** (1.959)	-12.283*** (2.672)
Internet users					-0.922*** (0.133)	-1.498*** (0.401)
Observations	36	36	36	36	35	22
R ²	0.30	0.39	0.45	0.53	0.78	0.77

Note: Robust standard errors in parentheses.

* Statistically significant at the 5% level

** Statistically significant at the 1% level

*** Statistically significant at the 0.1% level

Column (2) includes concern for privacy and an indicator of the Global Shapers Survey as additional explanatory variables. The coefficient of concern for privacy is positive and significant. This is consistent with individuals being more likely to pay in cash for retail purchases in countries where people are more concerned about privacy. The Global Shapers Survey dummy variable controls for differences between the two sources of data on privacy and trust in banks, as well as differences in the period of study associated with the two sources. The indicator is not significant, suggesting that there was no significant difference between the two sources.

Column (3) includes trust in banks and the Global Shapers Survey indicator. The coefficient of trust in banks is negative and significant. This is consistent with individuals being more likely to use cash in paying for retail purchases in countries where people have less trust in banks. The coefficient of the Global Shapers Survey indicator is negative and significant, suggesting that cash usage was lower in countries covered by the Global Shapers Survey. Yet, this negative coefficient should be interpreted with caution as it changes sign and becomes positive in the final specification.

Column (4) reports the estimates from a specification including both concern for privacy and confidence in banks. The coefficients on both variables are significant and similar in magnitude to the estimates obtained when each of these explanatory variables was included individually. This suggests that cash usage is higher when there is lower trust in banks for other reasons besides privacy concern, such as concerns over banking system stability.

Column (5) accounts for the technological sophistication in the country by including the proportion of Internet users. The coefficient of Internet users is negative and significant. This is consistent with the hypothesis that cash usage decreases with the level of sophistication in information and communications technologies, which in turn is likely to be correlated with the adoption of other payment innovations, such as mobile payment modes. After controlling for technological sophistication, the coefficients of GDP per capita and the Global Shapers Survey indicator are not statistically significant.

Finally, column (6) reports an estimate of the full specification limited to the observations of cash usage reported by central banks, which are more reliable relative to those from secondary sources. The coefficients of concern for privacy and confidence in banks are significant and greater in magnitude than the estimates including the entire sample. The coefficients of GDP per capita and the Global Shapers Survey indicator have the opposite signs compared to column (4), so they are to be interpreted with caution. After accounting for differences in technological sophistication, cash usage is higher in countries with higher GDP per capita and in those covered by the Global Shapers Survey.

In this specification, the estimated coefficient of concern for privacy implies that an increase in concern by one standard deviation (equivalent to an increase from the level in France to that in Korea) would be associated with an increase in cash usage by 9.8% points. Further, the estimated coefficient of trust in banks implies that an increase in trust by one standard deviation (equivalent to an increase from the level in the United States to that in Finland) would be associated with a reduction in cash usage by 12.3% points. These counterfactual estimates are substantial relative to the mean of 70.2%.

4 Discussion

Empirically, our cross-country analysis shows that the use of cash to pay for retail purchases increased with concern for privacy and decreased with confidence in banks. In contrast with factors such as fees for electronic payments and reliability of infrastructure, concern for privacy and trust in banks are psychological factors which cannot be easily influenced through economic policies. Our findings may help to explain the continuing persistent use of cash in retail payments, particularly in societies such as Japan where people are very concerned about privacy and Spain where people lack confidence in banks. Further, our findings suggest that government policy to promote electronic payments may have to address fundamental concerns about privacy and confidence in financial institutions. Country-specific experiences may weigh on policy decisions, especially where individuals have been aggrieved by large-scale data breaches, systemic banking crises or financial scandals.

Our analysis is subject to several limitations. First, the available data on concern for privacy and trust in banks in the Global Shapers Survey and World Values Survey is limited to a single observation per country. This constrained our study to a cross-sectional analysis. Second, data on usage of cash for about one-third of the countries was only available from secondary sources other than central banks, which are possibly less reliable. Nevertheless, our findings are robust to excluding these countries. Finally, we were unable to explicitly control for some potentially confounding factors such as the availability of electronic payment methods, the prevalence of retail spending, and the costs of holding cash.

References

- Bagnall, J, Bounie, D, Kim, P H, Kosse, A, Schmidt, T, Schuh, S and Stix, H** (2016), "Consumer Cash Usage: A Cross-Country Comparison with Payment Diary Survey Data", *International Journal of Central Banking*, Vol. 12(4), pp. 1–61.
- Bertaut, C, Haliassos, M and Michael Reiter** (2009), "Credit Card Debt Puzzles and Debt Revolvers for Self-control", *Review of Finance*, Vol. 13 (4), pp. 657–692.
- Boon, R** (2017), "Challenges SMEs Face in Going Cashless", *The Straits Times*, September 2.
- Chen, H, Kim, P H and Shy, O** (2019), "Cash Versus Card: Payment Discontinuities and the Burden of Holding Coins", *Journal of Banking & Finance*, Vol. 99, pp. 192–201.
- Connolly, S and Stavins, J** (2015), "Payment Instrument Adoption and Use in the United States, 2009-2013, by Consumers' Demographic Characteristics", *Federal Reserve Bank of Boston Research Data Reports* No. 15-6.
- Collinson, P** (2018), "Visa Admits 5m Payments Failed over a Broken Switch", *The Guardian*, June 19.
- Denecker, O, Istace, S and Niederkorn, M** (2013) "Forging a Path to Payments Digitization", *McKinsey on Payments*, Vol. 16, pp. 3–9.
- Deutsche Bundesbank** (2018), "Payment Behaviour in Germany in 2017: Fourth Study of the Utilisation of Cash and Cashless Payment Instruments", February 14.
- Doyle, M A, Fisher, C, Tellez, E and Yadav, A** (2017), "How Australians Pay: Evidence from the 2016 Consumer Payments Survey", *RBA Research Discussion Paper* rdp2017-04.
- Esselink, H and Hernandez, L** (2017), "The Use of Cash by Households in the Euro Area," *ECB Occasional Paper* No. 201.
- Greene, C and Stavins, J** (2018), "The 2016 and 2017 Surveys of Consumer Payment Choice: Summary Results," *Federal Reserve Bank of Boston Research Data Report* No. 18-3.
- Inglehart, R, Haerpfer, C, Moreno, A, Welzel, C, Kizilova, K, Diez-Medrano, J, Lagos, M, Norris, P, Ponarin, E and Puranen, B et al.** (eds.), "World Values Survey: All Rounds—Country-Pooled Datafile 1981–2014", JD Systems Institute, 2014.
- Jenkins, P** (2018), "'We Don't Take Cash': Is this the Future of Money?", *Financial Times*, May 10.
- Jobst, C and Stix, H** (2017), "Doomed to Disappear? The Surprising Return of Cash Across Time and Across Countries", *CEPR Discussion Paper* No. 12327.
- Kahn, C M, McAndrews, J and Roberds, W** (2005), "Money is Privacy", *International Economic Review*, Vol. 46(2), pp. 377–399.
- Von Kalckreuth, U, Schmidt, T and Stix, H** (2014), "Using Cash to Monitor Liquidity: Implications for Payments, Currency Demand, and Withdrawal Behaviour", *Journal of Money, Credit and Banking*, Vol. 46(8), pp. 1753–1786.
- Kantar Emor** (un-dated), "How People Pay for Their Everyday Shopping", Turu-uuringute AS.
- KPMG** (2016), "Singapore Payments Roadmap: Enabling the Future of Payments", August.
- Lewis, L** (2019), "Japan's Cash Addiction will not be Easily Broken", *Financial Times*, January 9.
- Menon, Ravi** (2016), "An Electronic Payments Society", Speech at Sim Kee Boon Institute Conference on FinTech and Financial Inclusion, Singapore, 19 August.
- Norges Bank** (2018), "Retail Payment Services 2017", *Norges Bank Papers* No. 2/2018.
- Osili, U O and Paulson, A** (2014), "Crises and Confidence: Systemic Banking Crises and Depositor Behavior", *Journal of Financial Economics*, Vol. 111(3), pp. 646–660.
- Privacy Commissioner of Canada** (2018), "Protecting Personal Information: Cannabis Transactions", Office of the Privacy Commissioner of Canada, Gatineau, Quebec.
- Rogoff, K** (2015), "Costs and Benefits to Phasing Out Paper Currency", *NBER Macroeconomics Annual*, Vol. 29(1), pp.445–456.
- Rusu, C and Stix H** (2017), "Cash and Card Payments—Recent Results of the Austrian Payment Diary Survey", Monetary Policy & the Economy, Oesterreichische Nationalbank.
- Sands, P** (2016), "Making it Harder for the Bad Guys: The Case for Eliminating High Denomination Notes", *M-RCBG Associate Working Paper Series* No. 52.
- Sveriges Riksbank** (2018), "Payment Statistics", (URL: <https://www.riksbank.se/en-gb/statistics/payments-notes-and-coins/payment-statistics/2018>).
- Swiss National Bank** (2018), "Survey on Payment Methods 2017", (URL: https://www.snb.ch/en/mmr/reference/paytrans_survey_report_2017/source/paytrans_survey_report_2017.en.pdf).
- UK Finance** (2018), "UK Payment Markets—Summary", (URL: ukfinance.org.uk/system/files/Summary-UK-Payment-Markets-2018.pdf).
- Vinayak, H V, Istace, F and Kamal, R** (2012), "Insights from McKinsey's Asia-Pacific Payments Map", *McKinsey on Payments*, September, pp. 3–9.
- Whitesell, W C** (1989), "The Demand for Currency Versus Debitable Accounts: Note", *Journal of Money, Credit and Banking*, Vol. 21(2), pp. 246–251.
- World Economic Forum** (2018), "Global Shapers Annual Survey 2017".