

Threats to Cash

September 2015



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Introduction

For quite some time now, decades in fact, I have been hearing that cash is under attack, that cash is dying and yet our annual research shows that cash in circulation is on the increase.

However in contrast to this we hear everyday about new payment methods that will 'destroy' cash and will replace cash. This report is designed to document the publicity we see and put this into perspective with regard to the current and likely impact on cash in society.


This report will generalize as there are pockets around the world with starkly different cash dynamics for example Scandinavia has moved to a ready acceptance of cards instead of cash and this has affected cash, however here we even see mini revolutions with some countries tripling the number of Independent ATM Deployers who see an opportunity to meet the demands of society by increasing the number of ATMs.

Everyday we continue to hear how new payment methods are developing which will abolish cash and cash in society. We see continuous announcements regarding how successful the new payment methods are and how they will result in a society with little or no need for cash. However we all know cash has been around for centuries and similar statements have been made in the past. So is it going to be different this time, and if so why?

This research is designed to document the current market announcements and put this into perspective in the payments market. We will also review the statistics and look behind the data at the trends and graphs to align the publicity with the reality.

*We will highlight
some of the new
payment methods
and how they are
developing or not
whilst also putting
into perspective the
impact they have
today and will have
in the market*





We will also highlight some of the new payment methods and how they are developing; putting this into perspective with the impact they have today and will have in the market.

We will look at new payment methods entering the market that have the possibility of making an impact such as:

- Apple Pay
- Android Pay
- Samsung Pay
- Contactless payment cards

The above are typical examples of mainstream mobile payments there are a plethora of other payments methods trying to enter the market.



1 Global Payments Landscape Today

How is the payments landscape made up today and how does it differ from region to region? We will attempt to show you how payment methods vary from one region to the next in today's terms.

The chart below indicates that cash is far more dominant in the USA than in Europe and in fact globally. However with the European picture being made up of over 34 countries there are some diverse spreads. Ireland has the highest cash usage in Europe per capita compared to Denmark where they wish to eliminate cash in the next few years.

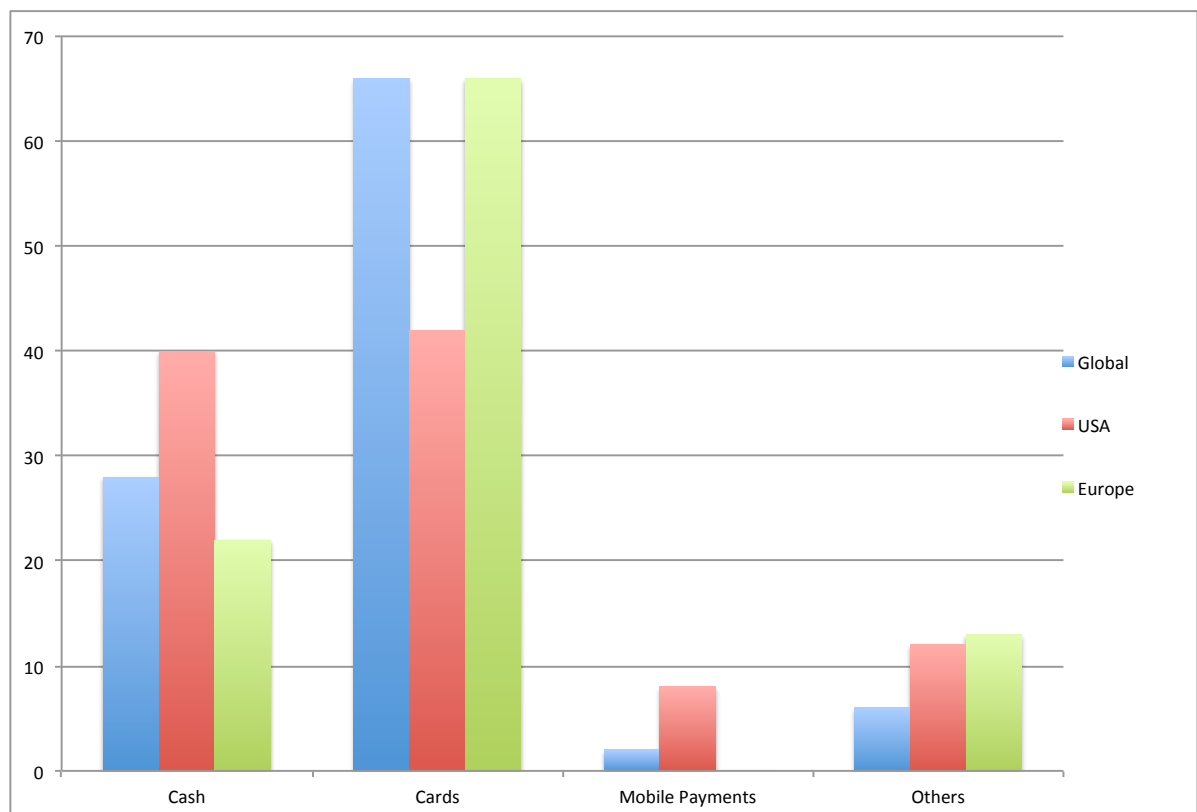


Figure 1. The Current Split of Payment methods

The following chart shows that there is an expected decline in the percentage use of cash as the aging population moves towards newer methods of payment and a younger

generation develop into having their own styles of money management. However, these statistics don't factor an increase in population in the next five years and the predicted increase to population of a billion by 2050.

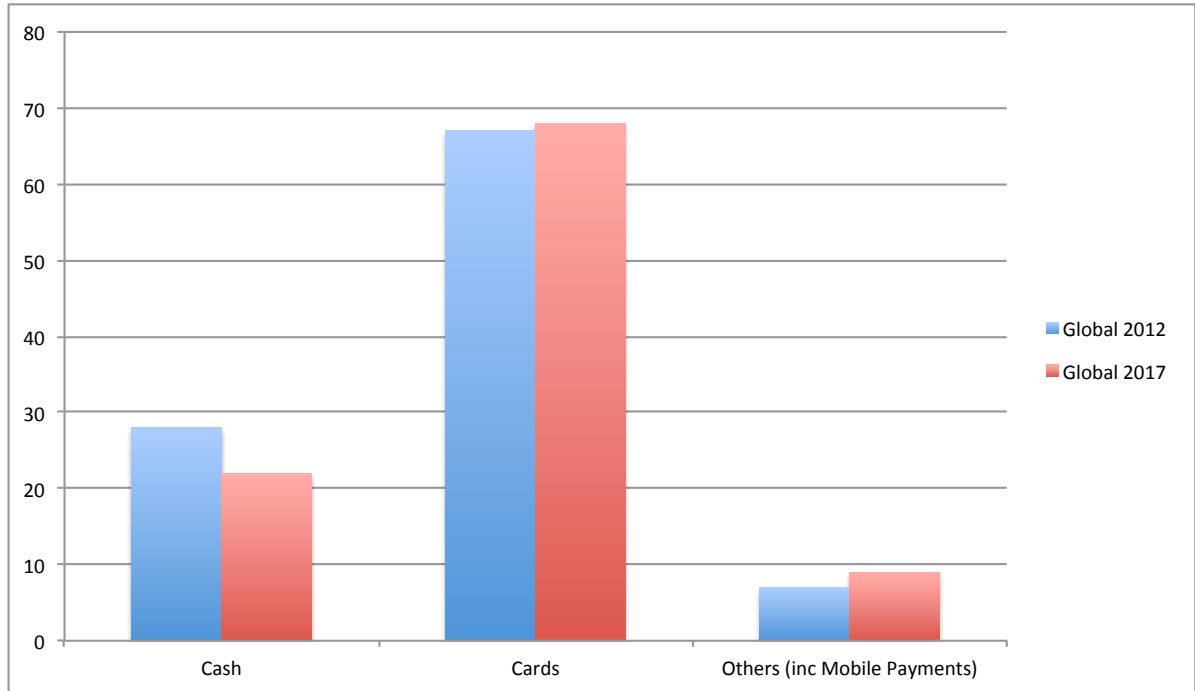


Figure 2. The Current Split and future split of Payment methods

1.1 Cash in Circulation

For decades now cash in circulation has been a benchmark for the dominance of cash; in the Appendix we will highlight the impact of the black economy as this supports the drive for cash in circulation as people avoid recorded payment methods. We should also remember cash usage varies depending on the demographics of society, with for example lower demographics relying on cash. The dynamics of the black economy change depend on the economy as, for example, in recession times people revert to cash to budget and this strengthens the black economy.

We can see the effect the economy has on cash in circulation in the final chart here for the USA, where cash in circulation dips at the end of the economic boom before the financial crisis hit, this is a perfect example of the roller coaster ride we see with cash in circulation.

We therefore see the black or shadow economy as an indicator of the need and indeed strength of cash in the economy. In an economic boom the population will be less dependent on the black economy and the counter is then very true in period of economic crisis.

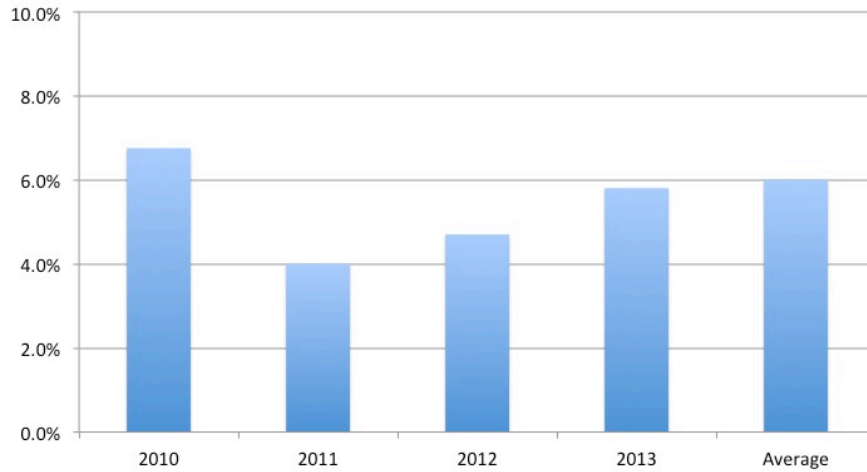


Figure 3. Percentage growth of currency in circulation - UK

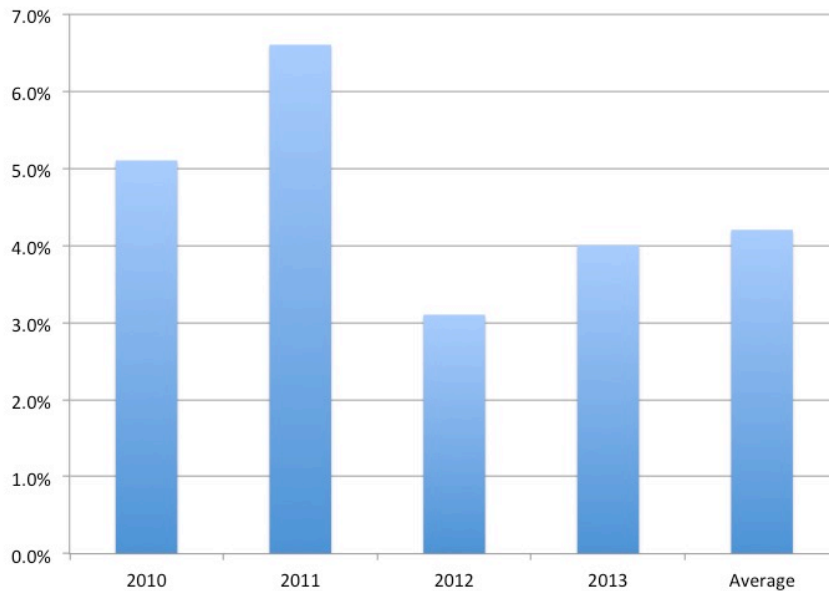


Figure 4. Percentage growth of currency in circulation - Europe

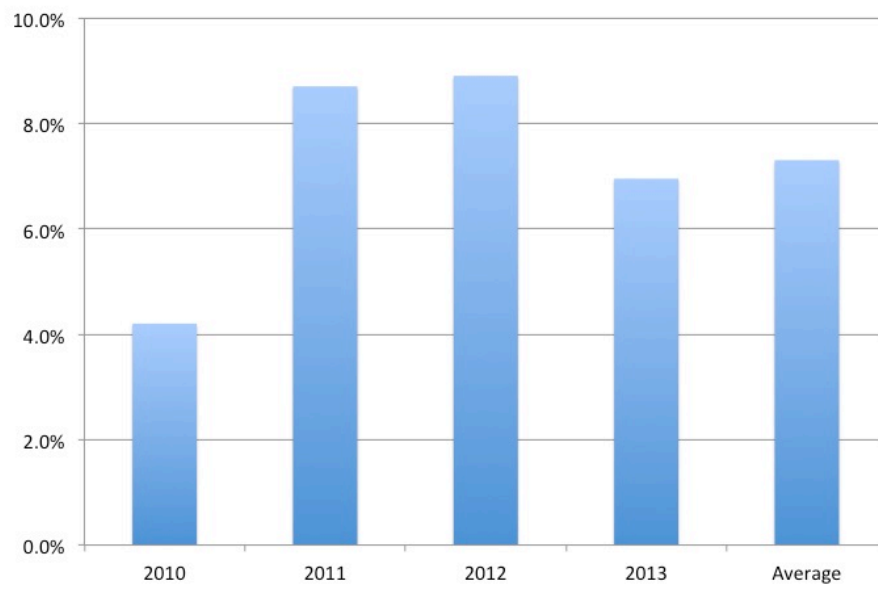


Figure 5. **Percentage growth of currency in circulation - USA**

2 How Cash is Threatened by New Payment Methods

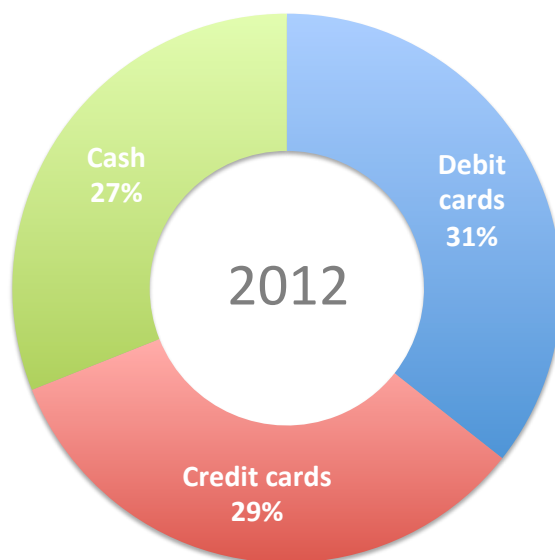
2.1 Threats for Cash

With much publicity surrounding the new methods of mobile payment it is easy to be persuaded that there has been a huge impact on cash. The main threats being Apple Pay, Android Pay, Samsung Pay and Contactless payment cards.

A key question is – are they a threat to cash or a threat to credit cards?

2.1.1 Retail sales

An online survey carried out by Javelin strategy and research of 3,200 consumers (globally) showed an almost equal split amongst credit, debit cards and cash. And in 2017 the predicted use of cash is 23%.¹, showing a small decline in cash over the next five years.



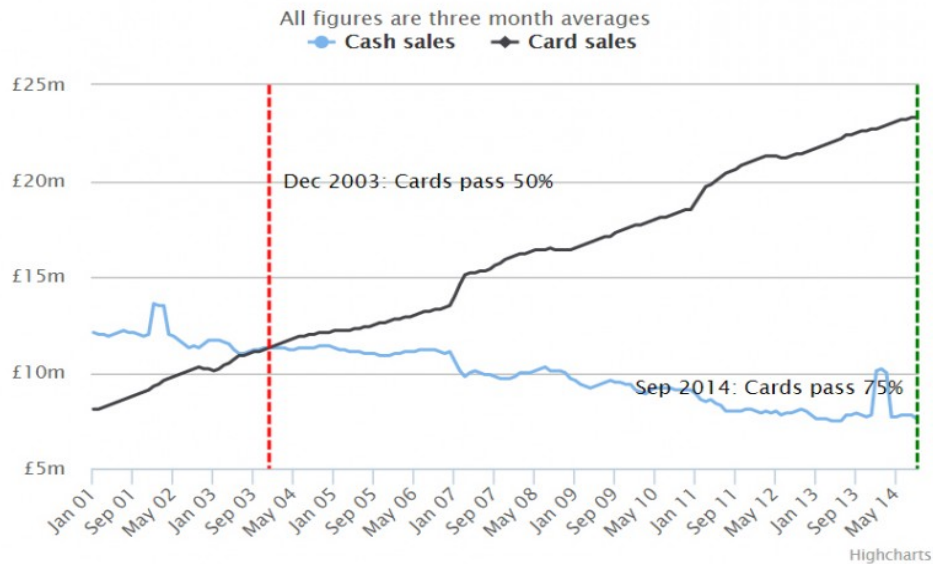


Figure 6. Plastic takes over in Retail

This shows how the amount spent on retail sales has changed from 2001 to 2014 in the UK.²⁷ Over time we believe new payment methods will replace retail purchases however cash will still be very relevant for smaller value payments and cash will be stronger in certain demographic sectors.

2.1.2 Mobile Payments

Mobile payments include Apple Pay, Android Pay, Samsung Pay and Contactless payment cards (I.e. MasterCard and Visa). Here we attempt to portray the predictions on their expected growth and how they vary:

- eMarketer expects mobile payments to grow to \$27.5 billion in 2016 from \$3.5 billion in 2014, in the U.S alone.^{13, 14}
- 2014 - \$50 billion in mobile purchases globally
- 2015 - \$214 billion in mobile purchases globally (Predicted by Michael. A. Robinson)
- This is a 328% jump in mobile purchases globally.¹⁶
- Analysts at Forrester research estimates that in-person mobile payments will reach \$34 billion in annual transactions globally, from \$3.7 billion in 2014, before the end of the decade.⁷
- Nearly a third of all Danish citizens prefer to use the “Mobilepay” app (Danske Bank’s official app) on their smartphones to pay for services and transactions.³⁴

- A recent JP Morgan's report shows that last year (2014) their active mobile customers increased by 22%.³⁸
- An online survey carried out by Harris interactive of 2,383 adults in November 2012 shows 66% of Americans believe smartphone payments will eventually replace both payment card and cash transactions for the majority of purchases.²⁶

We see mobile payment growth increasing rapidly over recent time however this is in fact from a small base and should be taken in context of overall growth occurring in the payment markets. When there is such a small base any growth is sometimes double or even treble digit, which looks very impressive but when put into perspective it is a small impact on cash. So each predication needs to be put into perspective.

The chart below shows a revised projection of how mobile payments will increase from 2012 to 2017. It should be noted the extent of increase was reduced once it was realised they were initially overestimated.

This can be seen because initial estimates put mobile payments at \$110 billion by 2018 but upon revision this was greatly reduced to \$60 billion in the U.S.⁹

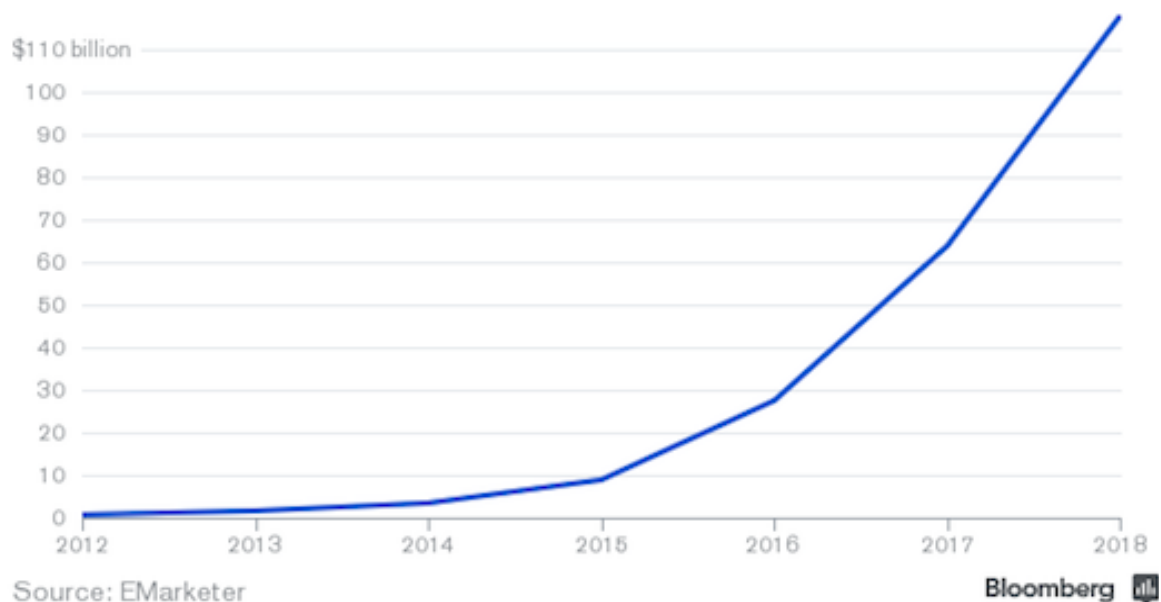


Figure 7. US Mobile Transaction Volume



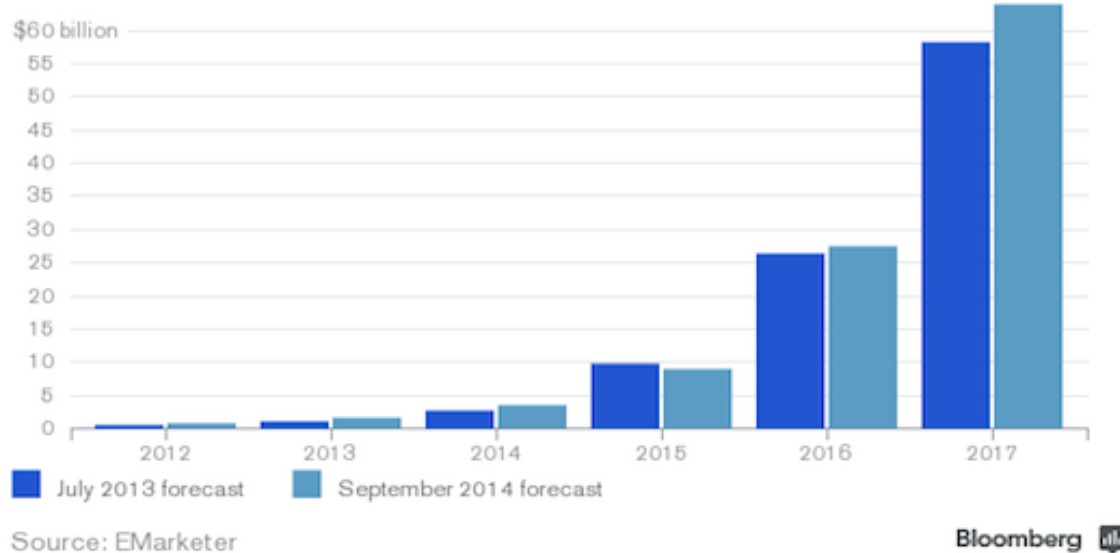


Figure 8. Revised US Mobile payments Projection

2.2 Non-cash Transactions – the P.R. as Publicised

- Anthemis Group's Ghiotti says that \$300 trillion non-cash transactions globally in 2012 are predicted to rise to \$800 trillion by 2020.⁶
- A global Federal Reserve study from 2014 shows 27% of the value of all transactions across all payment types are done electronically.¹¹
- A global Federal Reserve study from 2014 shows that over 30% of all transactions worth over \$100 are made using electronic or digital payment.¹¹
- The number of cash transactions has been decreasing since before 2005 and is predicted to drop to under 13 billion by 2023 in the UK (Figure 4).²⁷
- Transactions without cash will increase to over 27 billion by 2023 in the UK (Figure 4).²⁷
- A survey carried out by Barclaycard in 2012 in Britain claimed that 6 out of 10 people surveyed preferred to use cards to cash for purchases up to £20.²²
- A Federal Reserve study found that the number of ATM withdrawals in the U.S. decreased 0.9% per year from 2009 to 2012.³⁸

For years we have been predicting a reduction of cash in circulation and yet it remains as strong as ever with the volume of cash in circulation increasing more rapidly recently as governments such as the UK implement 'quantitative easing'.

The graph below shows how the number of transactions made with and without cash has changed from pre-2005 to 2014, and how it is predicted to change over the next 5 years in the UK.²⁷

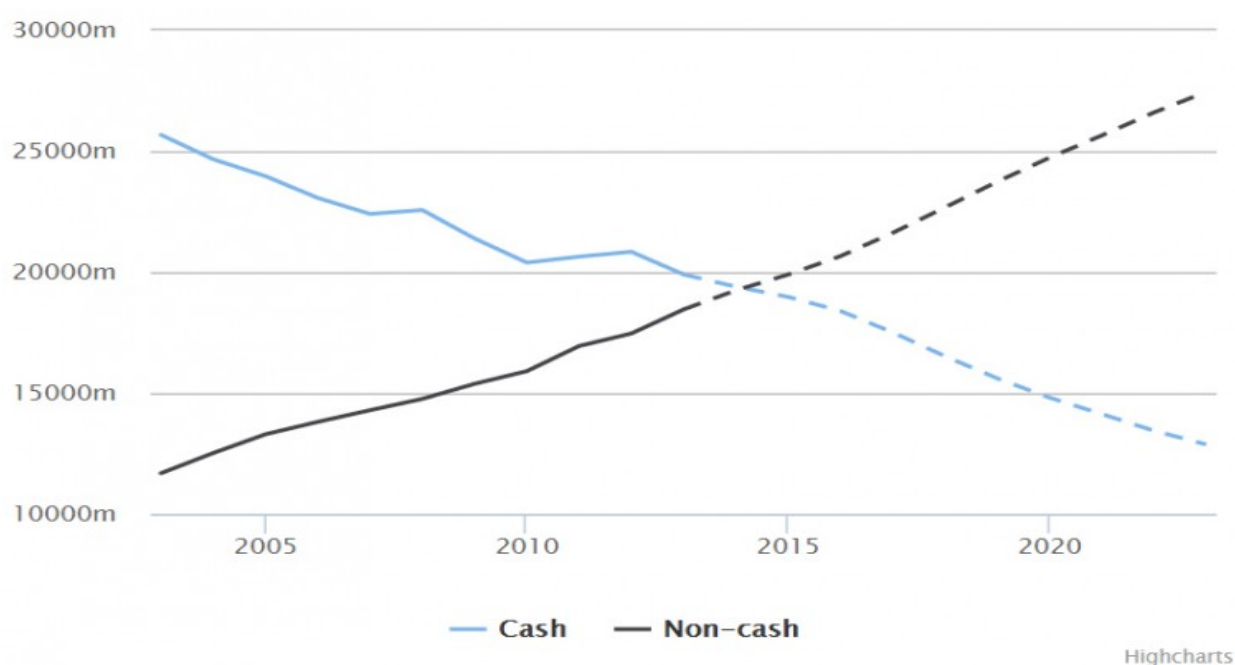


Figure 9. Number of cash transactions vs number without cash

2.3 Use of cash – the picture painted by publicity

- A survey carried out by UBS wealth management of over 1,000 millennials from December 2013 to January 2014 shows that cash attributes only 23% of the portfolios of generations other than 'millennials' in the U.S.⁵
- Many countries including Israel, Brazil, Australia, Finland, Argentina and New Zealand have eliminated their lowest denominations (i.e. there is no cash below a certain value).²⁸

- While Norway and Sweden have removed all physical money less than 50 ore (similar to 50c).²⁸
- Denmark is set to become the first 'cashless' country as the government has proposed to scrap all cash transactions in Denmark by as early as 2016.³⁴
- Support of reducing the need for cash can be seen in Israel, where in 2013, the government agreed to allow a committee to look at methods for reducing cash use.³³
- The 'end of cash' for the U.S government was seen on the 1st March 2013 when they stopped giving out any federal payments using paper checks and instead used electronic payments.³⁴
- In Italy, the Prime Minister Mario Monti put forward a proposal in December 2011 to limit the maximum amount of a cash transaction to under €1000 from the previous amount of €2500.³⁵
- Aite Group carried out research in 2011 that predicted the use of cash in the U.S. to decline by \$200 billion by 2015.³⁹
- A Federal reserve study in 2013 found that payments are becoming increasingly card-based and it found that the average payment made using a card is decreasing, which means people are using cards for the smaller purchases that cash would previously been used for.³⁹
- MasterCard estimates that 80% of consumer spending in the U.S. is cashless.³⁹
- Countries could save 1% of GDP by eliminating cash completely—for the U.S. that would be about \$150 billion a year.²⁸
- According to the Bank for International settlements bills and coins represent an average of 9% of the economy in the Eurozone and 7% in the U.S.³⁵

The following chart shows the predictions of professionals as to which payment method will grow the most in the next 5 years, with 52% of respondents predicting that contactless payments will grow the most.¹⁹



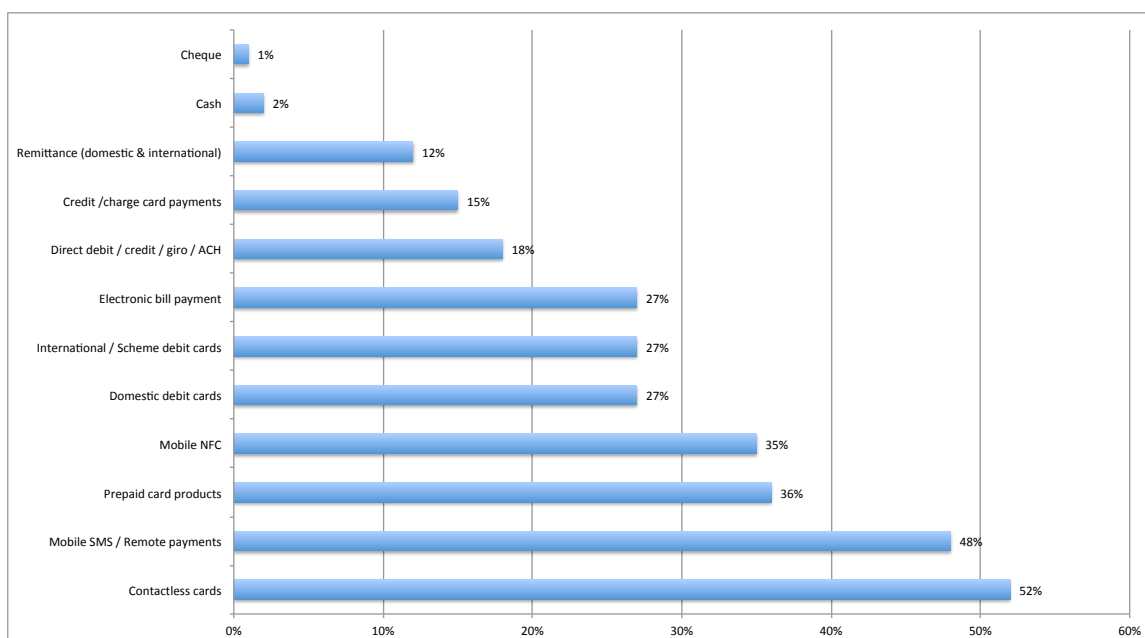


Figure 10. Survey results for product growth predictions over the next 5 years

We would reiterate our question – will contactless payments grow at the expense of cash or will it be at the expense of cards and so we see plastic cards being replaced by your mobile devices over time.

As pressure on the cost of transactions rises we see governments and banks try to eliminate cash. However the market dynamics do not always support this, for example Sweden where the demand for ATMs is actually rising despite the banks attempting to reduce the need for them – evidenced with the increasing number of IADs entering the Swedish market filling a void the banks have created.

2.4 Fraud – impact on new payment methods

Fraud is becoming far more of an issue than pure cash theft and so we need to monitor this as it will affect the alternative payments arena.

- A Federal Reserve payments study carried out in 2013 found that PIN debit card transactions had the lowest estimated fraud rates by both number and value in 2012.⁴²
- Mobile payments are more secure than traditional credit or debit cards. The retailer's system never has direct access to the cardholder's account number; so current point-of-sale malware doesn't work against it.⁴⁴

- A survey conducted by MasterCard in 2013 found 94% of the 63 people surveyed said that they would be willing to make a mobile payment if they knew it was secure.⁴⁶
- A report carried out by Europol shows that 30% of all reported cases of suspicious transactions in the EU are done with cash.⁵⁴
- Conservative estimates by Europol show that €1.5 billion in notes are seized by the EU member states every year.⁵⁴

2.5 Is the threat to cards as opposed to Cash

Here we will try and put into perspective how we believe mobile payments will dramatically affect card payments rather than cash payments as phones and other devices will replace plastic.

2.5.1 Mobile payments:

- An online survey of 225 mobile phone users conducted by Comrade (a web and mobile design firm) during November 2014 found that globally only 1 out of 10 consumers prefer to use mobile payments to cash (or credit cards).⁸
- Mobile payments will not replace cash entirely until it becomes more convenient and a few clear market leaders, such as Apple and Android, emerge to gain consumer confidence in the technology.⁸
- Payments Leader has found that Apple pay can currently only be used in 220,000 retailers in the U.S. While credit and debit cards can be used in over 9 million retailers in the U.S.¹⁰
- eMarketer research firm found that shoppers used smartphones to pay for \$3.5 billion in store purchases in the U.S last year (2014), however this was only a small slice of the \$4.3 trillion spent by shoppers in the U.S in total.¹⁴

This information supports the view that mobile payments will replace cards more so than they will replace cash.



2.6 Transactions – Distribution devices (ATMs) for cash are on the increase

- A global Federal Reserve study from 2014 found 40% of all transactions are done using cash, whereas credit cards are only used for 17% of transactions and debit cards are used for 25% of all transactions.¹¹
- According to London-based retail banking research global shipments of new ATMs reached a record 466,000 in 2014, which was up 5% from the previous year.³⁷
- Allied market research forecasts the number of ATMs globally to surge 11% a year till 2020.³⁷
- According to the US government accountability office America now has over 420,000 ATMs that total over 3.2 billion transactions of which nearly 2 billion are cash withdrawals.³⁹
- Aite group did find in their research in 2011 that the decrease by \$200 billion in cash transactions in 2015 was only a 4% decrease in cash usage and at this rate the use of cash in the U.S. would not fall below \$1 billion before 2205 (about 200 years time).³⁹
- Mark Bowerman from the payments council believes that by 2023 British consumers will still be spending £251 billion in cash per year, which is a third of all financial transactions in Britain.²⁴

2.7 Use of cash – dynamics which support cash

- A study published by ATM industry association in 2015 shows that the growth of currency in circulation was at an average of 8.9% each year across 30 advanced and developing economies from 2009 to 2013.²
- This same study by ATM industry association also indicated that global cash demand is increasing more than three times faster than worldwide economic growth.²

- Federal Reserve data shows that there was \$1.2 trillion of cash in circulation in the USA in 2014 and the total volume of cash in circulation has continued to grow over the past several years.³
- Minimum spends on card payments has stopped the complete eradication of cash.
- The move to a 'cashless' society is not popular because many are worried that all of their payments will be tracked, which is seen as a loss of privacy.³
- Millennials (21-36 year olds) attribute 52% of their portfolio to cash in the U.S according to a survey conducted by UBS wealth management of over 1000 millennials from December 2013 to January 2014. This survey also shows that they favour cash.⁵
- Half of people in there 50s and 30% of under 30s said they used cash for smaller purchases in a survey carried out by Citibank in 2014 in the U.S.⁷

2.8 Fraud

- According to a 2015 survey of about 1,100 companies in the U.S. carried out by LexisNexis Risk solutions, 21% of fraud cases in the U.S. involve mobile payments, despite only 14% of transactions being made using mobile payments.⁴³
- This survey also found that each dollar worth of mobile payment fraud in the U.S. cost the scammed merchant \$3.34.⁴³
- LexisNexis Risk Solutions released a report that found the revenue mobile commerce merchants lost to fraud spiked 70% in 2014 to 1.36%, compared with 0.80% in 2013.⁴⁵
- A survey of 2012 adults conducted by Payments council (a trade body) in the UK found that 26% of consumers avoid using contactless payment cards due to security fears. This became known as 'paynuphobia'.²¹
- A survey carried out by MasterCard in 2013 found that 63% of respondents thought their personal information was more vulnerable when using a mobile phone for purchases.⁴⁶

3 Conclusion

If we believed the PR it would seem that the effect of Apple pay, Android pay and contactless payments has reduced the need for cash in our society. However as it can be seen the possibility of a 'cashless' society is far away and the need for cash for the small, irregular transactions is still very high. We must not forget that cash is needed to support the grey or black economies, which exist in every country. Thus making cash an extremely useful payment method despite the advances in technology to make transactions far simpler. So from the information collected we would conclude that the possibility of cash becoming 'extinct' is far-fetched and further innovations and advances in the payment technology are required before this becomes a reality. However the introduction of Apple pay, Android pay and contactless payments will definitely play a role in reducing the amount of cash needed in society and may lead to the eradication of cash but not within the next 10-20 years.

To put this into perspective, we have been researching the demise of cash for nearly two decades now and in fact cash in circulation has increased despite all the market rhetoric – the increase is driven by economic conditions, strength of the black or shadow economies and the basic confidence in the product. At the end of the day technology fails however your wallet cannot lose power, cannot lose the mobile connection nor can it break.....

There is absolutely no doubt that there is a plethora of new payment methods the question is not will new payment methods be successful but which one will be successful. Mobile payments will dramatically affect card payments in the short term and as confidence strengthens we will see the new payment methods erode the strength of cash. Cash will reduce the question is by how much and over what timescale and this erosion will vary by country, region, and demographic. However we do not see the demise of cash in the near future. At the end of the day mobile technology has flaws, as does cash and so there is space for both methods as they compensate for each other.





If there is one conclusion to be drawn from this research then it is that both cash and the new payments methods will adapt and morph as each develops. Already we see contactless and cardless transactions affect the profile and usage at ATMs this will grow and adapt also. We believe that new payment methods will more affect card payments, and in fact we will see ATMs and the new payment methods merge.

For us the future requires each of us to have a spectrum of tools in our tool box to match the changing demands of society.



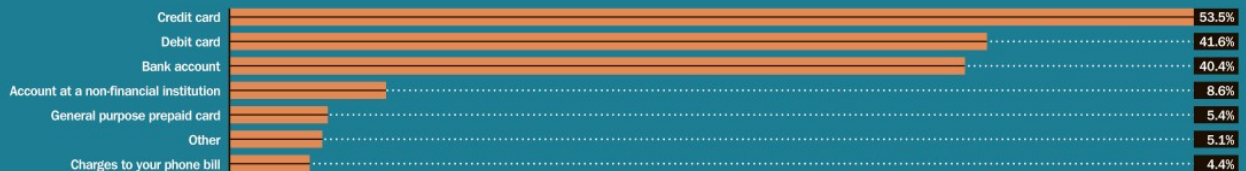
Additional information¹²:

Despite the threat on cash we actually see new payment methods competing with each other initially. Here we see mobile payments predominantly being funded by credit cards.

MOBILE PAYMENTS WORLD VIEW

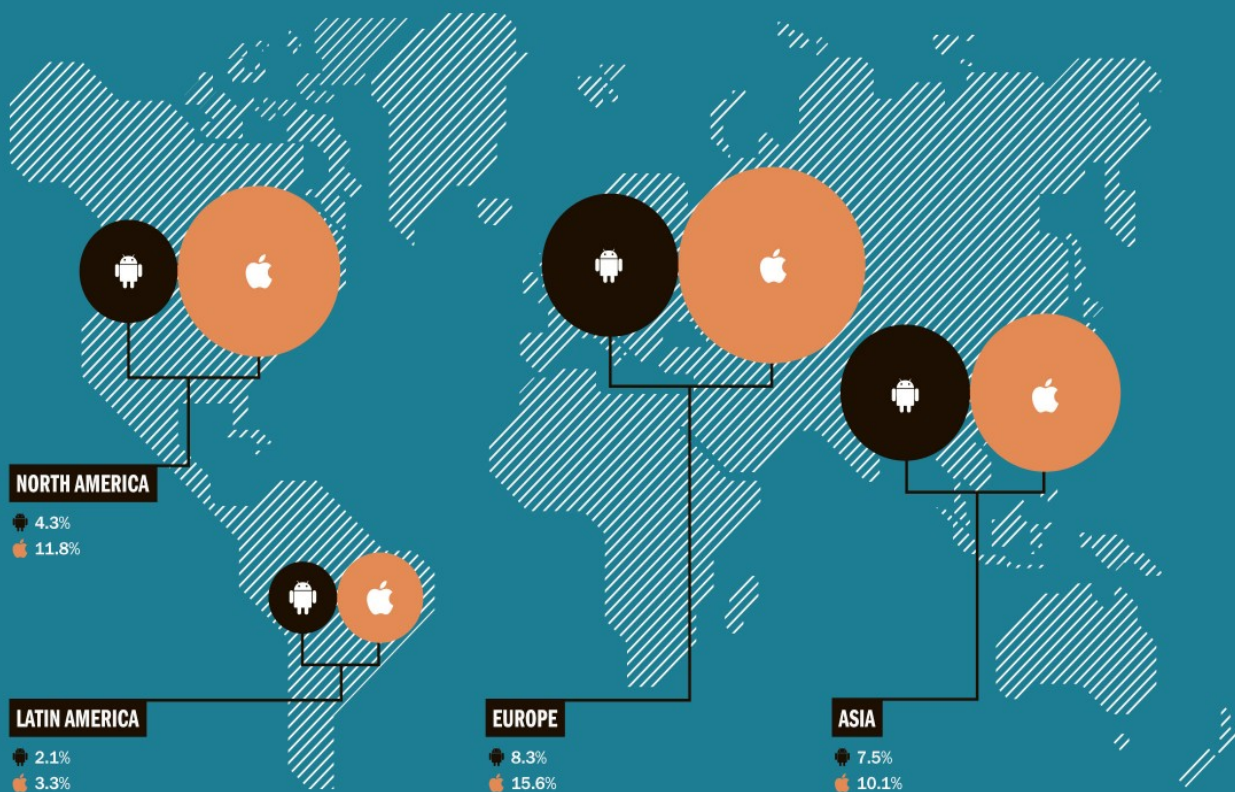
How do you fund your mobile payments?

Source: GfK

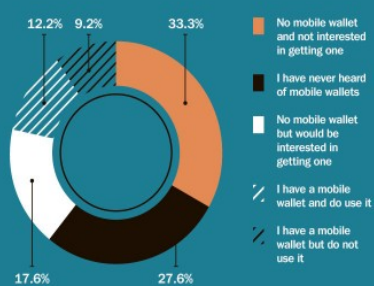


Online payments: iOS versus Android

Source: Ayden

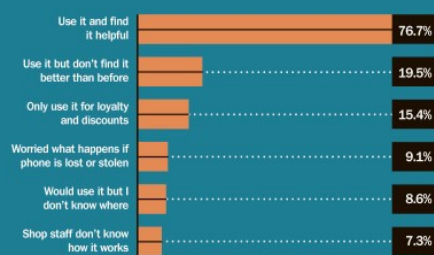


Global trend: Mobile wallets



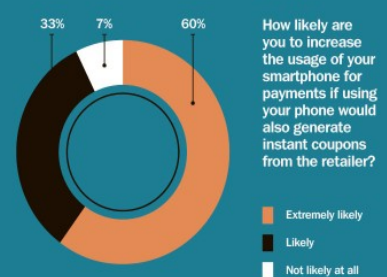
Source: Mobile Wallet and Digital Content Analytics, Mobile Wallet Penetration

Worldwide: Consumers with a mobile wallet



Source: Mobile Wallet and Digital Content Analytics, Mobile Wallet Attitudes

Attitudes to mobile payment



Source: Accenture, Consumer Mobile Payments Survey

4 Recent Alternatives to Cash

There are three main recent alternatives to cash:

- Apple pay
- Android pay
- Contactless payments, including MasterCard, Visa and American Express.
- Samsung pay
- Digital wallets, including Google Wallet, Paypal and Apple Passbook.

On top of this there are also less successful alternatives called digital wallets, these include “Google wallet, Apple Passbook and Paypal.

Firstly it must be realised that the adoption rate of the Apple pay, Android pay and contactless payments will be enhanced because by using these methods merchants avoid the 2-3% transaction fee needed for normal credit/debit cards.¹⁵

4.1 Apple pay

4.1.1 Adoption rates

Apple pay has been introduced with minimal disruption, as the contactless technology (NFC) needed for it to function is already present in many retail stores worldwide for contactless payments. Apple has agreed deals with Visa, MasterCard, American Express, Bank of America, Capital one and Citi bank, which will allow Apple pay to be compatible with most credit cards.³¹ It cannot however be used in any retail stores involved in the agreement with Merchant Currency exchange (MCX).¹⁵

N.B. Merchant currency exchange (MCX) is a company created by a handful of U.S. retail companies, such as Alon Brands, Shell oil products US and Walmart, to develop a merchant-owned



mobile payment system, called CurrentC. This stops these companies from using any other type of mobile payment system other than the CurrentC system. ³⁶

So Walmart, Exxon Mobil, Target and Best buy are ruled out from using the technology needed for Apple pay.¹⁵ This eliminates over \$1 trillion in potential annual sales for Apple as this is the net sales of these companies in the U.S.^{15, 36} Barclays bank have also not agreed a deal with Apply pay to use its technology, ruling out further potential sales.¹⁵ Analysts from “Computerworld” have found that Apple pay also only works at 5% of retail stores in the U.S (220,000 retail stores).²⁹ A March poll carried out by Payment redesign found that on Black Friday in 2014, 95% of Apple Pay-activated iPhone 6 users did not use Apple Pay. This did decrease to 85% in March 2015 but still means the majority of users don’t utilise Apple Pay. 48% of first time users do not use Apple pay again based on their initial experience according to the March Poll.

4.1.2 Disruptive potential

Apple CEO Tim Cook has claimed that after only 3 months of being released \$2 out of every \$3 spent using contactless payments across Visa, MasterCard and American Express in the U.S. are made using Apply Pay.¹⁸ A report published by ITG market research in December 2014 shows that Apply Pay gained a 1.7% market share gain after only being released for 6 weeks.¹⁵ It will have a huge threat to cash / ATMs due to the ease with which it has been accepted and the speed with which its compatibility with many retail stores is growing. Apple pay will work with 90% of the credit card volume in the U.S., as deals have been made with the largest banks which cover this volume of credit card usage in the U.S.³²

4.2 Android pay

4.2.1 Adoption rates

Google says that 7 out of 10 Android devices are ready for Android pay.¹⁷ It also states that 700,000 merchants can accept Android pay in store in the U.S.¹⁷



4.2.2 Disruptive potential

Android pay has a smaller potential market than Apple pay and contactless because there are fewer Android phones capable of using Android pay.

4.3 Contactless Payments

4.3.1 Adoption rates

In a report released by ICM research in 2012 only 8% of the 2001 people surveyed in the UK had made a contactless payment.²¹ A survey by Payments council in 2012 found that 26% of the 2012 consumers surveyed in the UK avoid using contactless payment due to security fears.²¹ Figures from the Payments council predict that contactless payment transactions will rise to 700 million in Britain by the end of 2015.²⁴ Figure xxx shows that the adoption rate of contactless payments has slowed globally since it was first introduced in 2004/2005. However the usage of contactless cards is still growing.²⁰

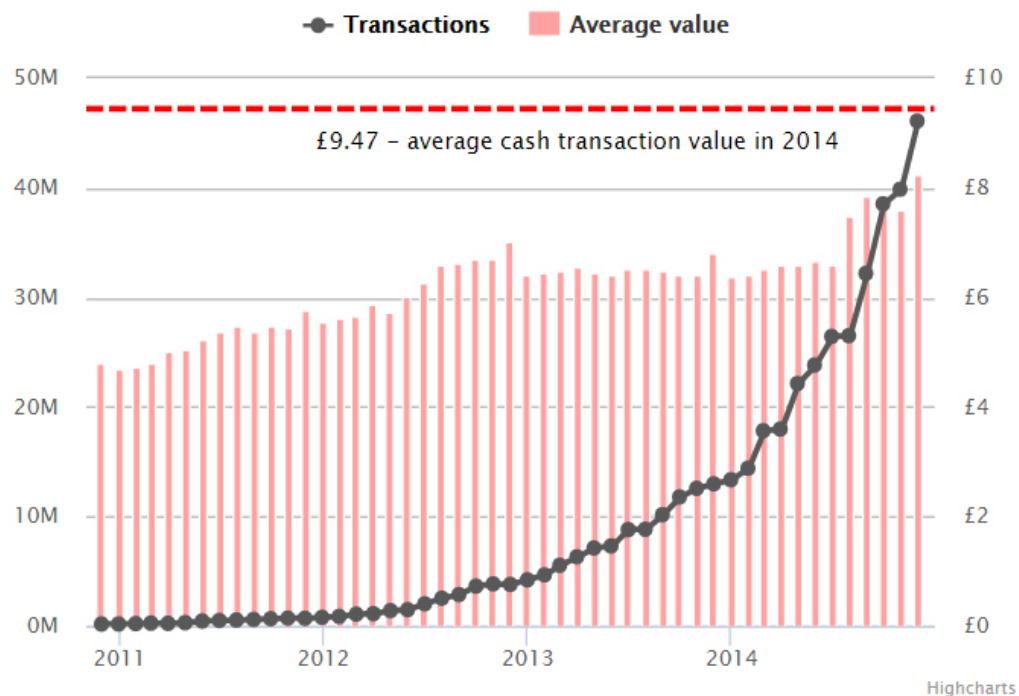


Figure 11. The rise of contactless payment



4.3.2 Disruptive potential

By the 1st January 2016 all new POS terminal deployments will need to be compatible with contactless payment if they accept MasterCard or Maestro cards.²³ By 2020 all POS terminals will need to be updated to feature contactless payment compatibilities.²³

4.4 Samsung pay

4.4.1 Adoption rates

Samsung has agreed deals with many large companies, including payment networks such as Visa and MasterCard and financial players such as American Express, Bank of America and JP Morgan Chase.²⁹ A lot of the infrastructure needed to introduce Samsung pay is already in place as it was set up previously for Apple pay.²⁹ However Samsung pay will only work on devices that have an additional “Loop Play” device attached to them. This will make the Samsung pay slightly less adoptable because it will limit the number of people and devices that are compatible with the technology.³⁰

4.4.2 Disruptive potential

Samsung believes that Samsung pay will work at 90% of retail stores in the U.S.²⁹ Samsung believes it has the potential of being accepted globally at 30 million merchants.²⁹

4.5 Digital Wallets

The precursor to contactless payments.²⁵ the most successful ‘digital wallets’ are PayPal, Google Wallet and Apple Passbook.

PayPal is a great success and it accounts for 30% of eCommerce in the U.S and is used by over 150 million people worldwide. However it does not pose a threat to cash because the niche it covers does not hinder or overlap with the niche for cash.⁴⁷ They have subsequently been overtaken by contactless payments and Apple/Android pay. The concept of digital wallets has ‘died’ due to the rapid increase in the number of people with smart phones, due to rapid sales by both Apple and Android.²⁵ Digital wallets will not threaten cash or ATMs to a great extent.



5 Regional Threat to Cash

There are two sides to every story and we review the facts regarding the supposed threats to cash and the actual threats.

5.1 USA

5.1.1 Cash is threatened – the facts

- A survey carried out by UBS wealth management of over 1000 millennials from December 2013 to January 2014 shows that cash attributes only 23% of the portfolios of generations other than 'millennials' in the U.S.⁵
- eMarketer expects mobile payments to grow to \$27.5 billion in 2016 from \$3.5 billion in 2014, in the U.S alone.^{13, 14}
- An online survey carried out by Harris interactive of 2,383 adults in November 2012 shows 66% of Americans believe smartphone payments will eventually replace both payment card and cash transactions for the majority of purchases.²⁶
- Countries could save 1% of GDP by eliminating cash completely—for the U.S. that would be about \$150 billion a year.²⁸
- The 'end of cash' for the U.S government was seen on the 1st March 2013 when they stopped giving out any federal payments using paper checks and instead used electronic payments.³⁴
- According to the Bank for International settlements bills and coins represent an average of 7% of the economy in the U.S.³⁵
- A Federal Reserve study found that the number of ATM withdrawals in the U.S. decreased 0.9% per year from 2009 to 2012.³
- MasterCard estimates that 80% of consumer spending in the U.S. is cashless.³⁹



5.1.2 Cash isn't threatened – the facts

- Federal Reserve data shows that there was \$1.2 trillion of cash in circulation in the USA in 2014 and the total volume of cash in circulation has continued to grow over the past several years.³
- Millennials (21-36 year olds) attribute 52% of their portfolio to cash in the U.S according to a survey conducted by UBS wealth management of over 1000 millennials from December 2013 to January 2014. This survey also shows that they favour cash.⁵
- Half of people in there 50s and 30% of under 30s said they used cash for smaller purchases in a survey carried out by Citibank in 2014 in the U.S.⁷
- eMarketer research firm found that shoppers used smartphones to pay for \$3.5 billion in store purchases in the U.S last year (2014), however this was only a small slice of the \$4.3 trillion spent by shoppers in the U.S in total.¹⁴
- According to the US government accountability office America now has over 420,000 ATMs that total over 3.2 billion transactions of which nearly 2 billion are cash withdrawals.³⁹
- Aite group did find in their research in 2011 that the decrease by \$200 billion in cash transactions in 2015 was only a 4% decrease in cash usage and at this rate the use of cash in the U.S. would not fall below \$1 billion before 2205 (about 200 years time).³⁹

5.1.3 Conclusion

In the USA cash is threatened more so than any other area of the world. This is because the technological advances in the USA are far quicker and tend to occur before any other country. However the possibility of a 'cashless' society in the USA is unlikely because the rate at which cash is being reduced in the USA is quite slow while there is still a growth in the number of ATMs is steady and set to continue for the foreseeable future. We still see resistive trends also such as the demographic challenges and the black economy which will resist the move to mobile payments.



5.2 Europe

5.2.1 Cash is threatened – the facts

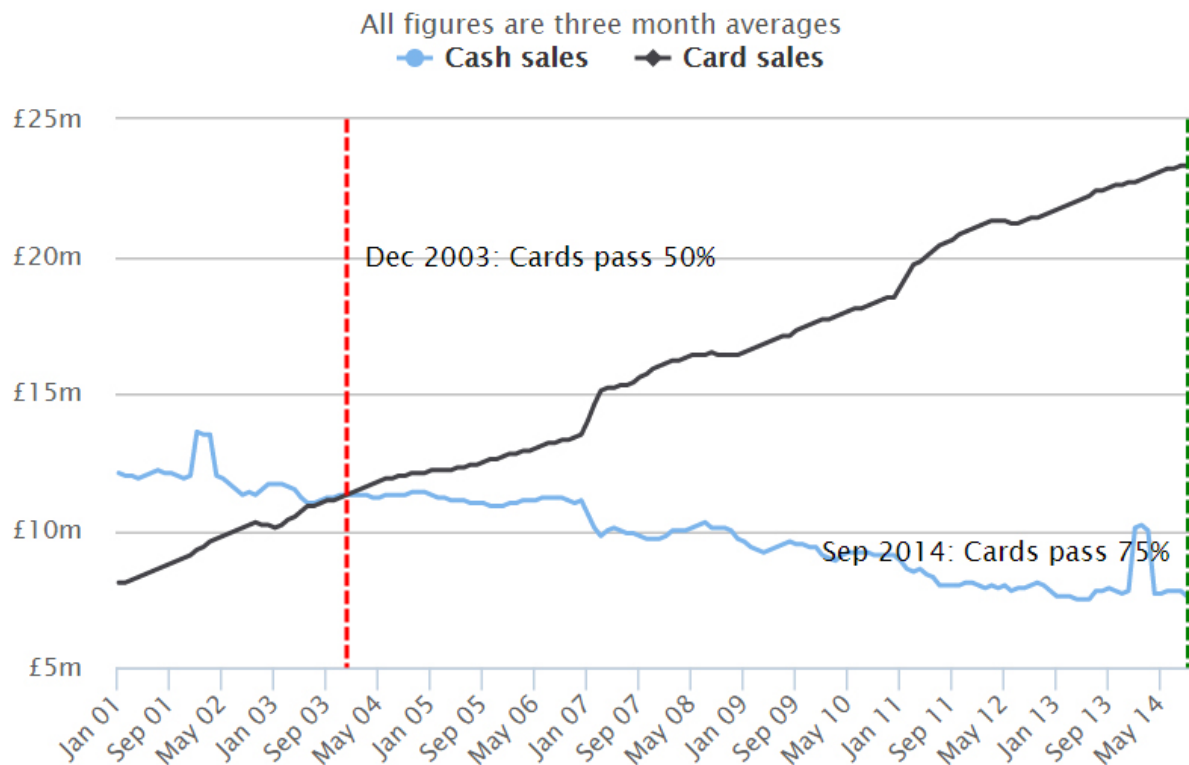


Figure 12. Retail: cash takes over

- The number of cash transactions has been decreasing since before 2005 and is predicted to drop to under 13 billion by 2023 in the UK (Figure 12).²⁷
- Transactions without cash will increase to over 27 billion by 2023 in the UK (Figure 12).²⁷
- Cash currently accounts for less than 25% of retail sales in the UK (Figure 1).²⁷
- A survey carried out by Barclaycard in 2012 in Britain claimed that 6 out of 10 people surveyed preferred to use cards to cash for purchases up to £20.²²
- While Norway and Sweden have removed all physical money less than 50 ore (similar to 50c).²⁸

- Denmark is set to become the first ‘cashless’ country as the government has proposed to scrap all cash transactions in Denmark by as early as 2016.³⁴
- Nearly a third of all Danish citizens prefer to use the “Mobilepay” app (Danske Bank’s official app) on their smartphones to pay for services and transactions.³⁴
- Scandinavians currently use cash for less than 6% of their payments according to Digital trends.⁶⁴
- The centre of Economic and Business Research has estimated that 20 million people will use their mobiles to pay for goods and services in the UK by the end of the decade.⁶⁰
- According to the Bank for International settlements bills and coins represent an average of 9% of the economy in the Eurozone.³⁵
- In Italy, the Prime Minister Mario Monti put forward a proposal in December 2011 to limit the maximum amount of a cash transaction to under €1000 from the previous amount of €2500.³⁵

The chart below shows how the number of transactions made with and without cash has changed from pre-2005 to 2014, and how it is predicted to change over the next few years in the UK.²⁷

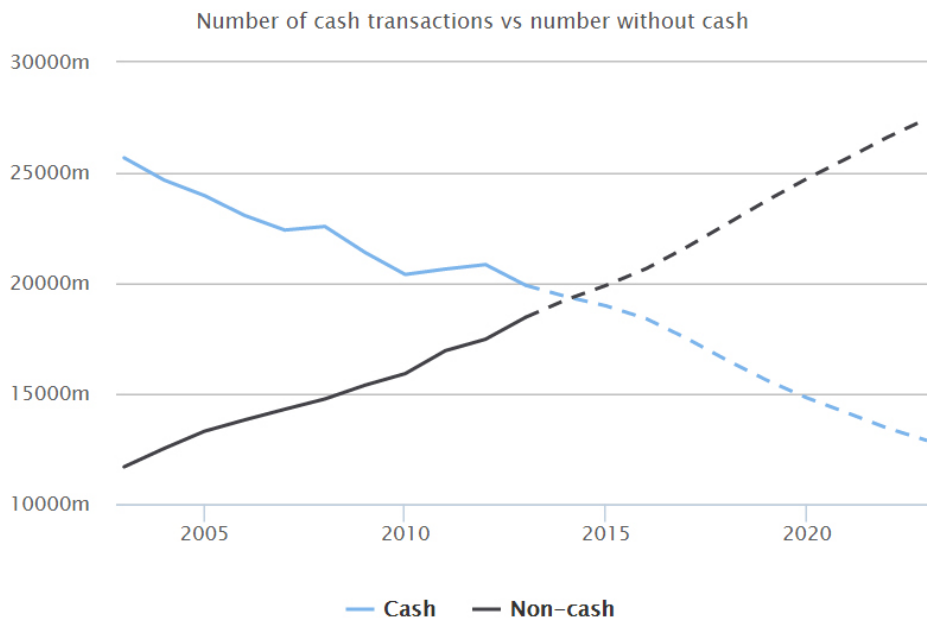


Figure 13. Number of cash transactions vs number without cash

- Euromoney has found that the annual growth rate in mobile payments is at 95% (2012).⁶

5.2.2 Cash is not threatened – the facts

- A survey of 2012 adults conducted by Payments council (a trade body) in the UK found that 26% of consumers avoid using contactless payment cards due to security fears. This became known as 'paynuphobia'.²¹
- Mark Bowerman from the payments council believes that by 2023 British consumers will still be spending £251 billion in cash per year, which is a third of all financial transactions in Britain.²⁴
- The EU has a huge volume of cash in circulation at \$6,736,000,000,000.⁴⁰

5.2.3 Conclusion

In Europe the increase in cashless transactions is rapid as the number of cash transactions made, especially in the UK, has been decreasing for over a decade and the point at which cashless transactions outweighs cash transactions was reached earlier this year. This suggests that cash is threatened in Europe, furthermore the evidence of a 'cashless' Europe can be seen to be developing in countries such as Sweden and Denmark where they have become almost 100%





‘cashless’ as mobile payments have nearly entirely taken over. On the other hand this is only 3 of the 28 countries in the Europe, so it must be noted that in the other 25 countries (apart from a few such as Italy) there is little indication of movement towards an entirely ‘cashless’ Europe. Therefore it can be concluded that cash is threatened in Europe but it will not become obsolete in the near future as the change is a slow process and the niche for cash is still very large.

5.3 Asia

- There is no discussion on Asia moving towards a cashless society suggesting that cash is not threatened in Asia.
- Japan has the second most cash in circulation of any country worldwide at \$5,403,000,000,000 (December 2014).⁴⁰
- While China has the largest volume of cash in circulation of a single country at \$5,667,000,000,000 (December 2014).⁴⁰
- This can be compared to the volume of cash in circulation in the US, which is at \$2,943,000,000,000 (December 2014). This shows that in Asia there is no threat to cash as the volume present is still much larger than the US where cash is becoming threatened.⁴⁰
- 38% of consumer transactions in Japan are carried out using cash (Compared to Britain where cash accounts for only 11% of transactions).⁵⁵
- Demand for bank notes has been rising in Japan 4% in 2014.⁵⁵

So we can conclude that there is no threat to cash in Asia.

5.4 South America

- There are no clear articles on the possibility of cash being threatened in South America. This suggests that cash is not threatened in South America.
- Moreover the volume of cash in South America as a whole is quite large as Venezuela and Brazil both have large amounts of cash in circulation. Venezuela has



\$356,000,000,000 in circulation as cash, 15th highest in the world. While Brazil has \$160,400,000,000 in circulation as cash, 25th highest in the world.⁴¹

- So as just two of the 14 countries in South America have \$516,400,000,000 in circulation as cash it can be concluded that cash is not under threat in South America as there is far too much in circulation to be the case.⁴¹

So we can conclude that there is no threat to cash in South America.

5.5 Australia

- Australia is leading global adoption of contactless NFC technology with over 1/3 of all card transactions being made using “Tap and PIN”.⁴⁸
- Culturally Australia is very likely to move towards becoming a ‘cashless’ country as they have an 81% adoption rate of smartphones and are generally used to advances in technology.⁴⁸
- 33% of all transactions in Australia are contactless and the maximum limit for contactless payments is greater in Australia than any other country, at \$100.⁴⁸
- A lot of marketing carried out in Australia looks at a ‘cashless’ country being a reality in a few years time.⁴⁸
- ATM cash withdrawals have decreased by 25% since 2009, when contactless cards were first issued.⁴⁸
- Supermarkets and restaurants are viewed as being poor and outdated if they do not accept contactless payments or only accept credit and debit card payments. This is because mobile payments and contactless payments have gained vast amounts of popularity since being introduced in Australia.⁴⁸

From this we can conclude that in Australia the threat to cash is huge as the reality of Australia becoming ‘cashless’ could occur in the next few years because of the popularity towards not using cash and because the infrastructure to do so is very nearly completed.

6 Case Studies

6.1 Zapp in the UK

Zapp is the UK's leading mobile payment innovator, within the Vocalink group, and is backed by some of the biggest names in financial services and retail.

Zapp's 'Pay-by-Bank' app service will be available from October 2015 to Barclays Pingit users making Pay by Bank app the UK's first total market mobile payment solution.

However to begin with the Zapp pay app will only work for online payments initially, with a date for its use for in-person transactions not yet released.^{61, 65}

Peter Keenan, CEO of Zapp, has predicted that by late 2015 1 out of every 5 store payments in the UK will be carried out using Zapp pay.⁶⁰ Peter Keenan also claimed that Zapp will be more secure than current card payments because card numbers and details aren't shared with any third parties.

Zapp has been accepted by five main banks in the UK; Barclays, HSBC, Nationwide, Santander and Metro bank.

This will mean 18 million UK current account holders will have access to the Zapp pay application.^{60, 61}

On top of bank support, Zapp is also supported by a variety of retail stores including Sainsbury's, Asda, House of Fraser, Thomas Cook and Shop direct.⁶¹

This all sounds very impressive however the launch has been delayed due to lack of traction.



6.2 Sweden moving towards a 'cashless' society

The 6 largest Nordic banks have been gradually weaning off cash since 2010, which has been embraced by citizens as a natural move forwards.⁵⁷ This movement was seen between 2010 and 2012 where 500 bank branches went cashless and 900 ATMs were removed from Sweden.⁵⁷ The last main place that cash is now available in Sweden is at supermarket checkouts, where up to 500 Swedish Krona (CHF 55) per purchase can be obtained.⁵⁷

Niklas Arvidsson from Sweden's Royal Institute of Technology has predicted that "by 2030 we [Sweden] will be completely cash-free." and has found that 4 out of 5 purchases in Sweden are now made electronically.^{57, 58} The movement towards a 'cashless' society has also meant that the Swedish Banker's Association has seen the number of armed robberies decrease to a 30-year low.⁵⁸

There are however, concerns over the 1.8 million pensioners that make up nearly 20% of the Swedish population being able to adapt to cash. Many pensioners feel excluded by the country's attempt to move to a 'cashless' society and only 50% use cash-cards with 7% having never used a cash-card, according to the Swedish National Pensioners' Organisation.⁵⁸

There is also a challenge for tourists because in order to use the bus service in the capital tourist must obtain pre-paid tickets or a mobile phone registered in Sweden.⁵⁸

The main problem of a 'cashless' country was seen at Sweden's first 'cashless' festival where the payment system crashed, meaning people had to use an IOU system for transactions.⁵⁸

Increase in Fraud

The Swedish National Council have also found that Fraud is a major concern because since the movement towards a 'cashless' country began the volume of fraud has doubled, over the last 10 years.⁵⁸



The public appears to not fully support the movement because many see cash as a necessity and are very sentimental with the cash they have. Moreover two thirds of Swedes think carrying cash is a human right. This will hinder the movement towards a 'cashless' country, as there could be mass protests against the movement because people may feel 'forced into a corner'.⁵⁸

Again very impressive plans however in reality the consumers are demanding greater access to cash and the number of IADs are increasing as the banks create an ATM vacuum removing access to cash at a rate greater than the consumer will tolerate.

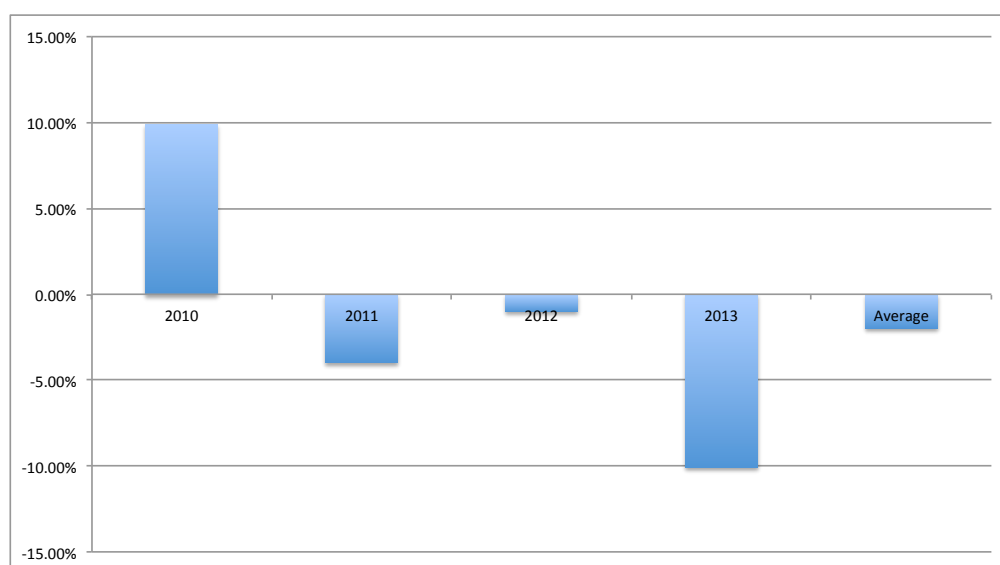


Figure 14. The growth of currency in circulation in Sweden from 2010 to 2013

6.3 MobilePay in Denmark

Denmark is set to become the first 'cashless' country in the world as the government has proposed to scrap all cash transactions by as early as January 2016.³⁴ MobilePay is a mobile payments app that allows users to avoid paying with cash and instead pay quick and easily using their cards. The app works by simply requiring a 4-digit pin to login to your account, the amount of money and the mobile number of the recipient are then entered into the app and the amount of money is sent securely to the recipient's MobilePay app. The app produces a receipt and an overview of all transactions made in order to keep track of all payments made, to further increase the security of the app.⁶⁶



When MobilePay was first introduced it had been downloaded 300,000 times within 10 weeks of release and then 600,000 times a few weeks later.⁶³ MobilePay has made the transition to a 'cashless' country much quicker because nearly a third of all Danish citizens already used the app to pay for services and transactions before the announcement was made to move to a becoming cashless country.³⁴ Moreover after the announcement the number of people who had installed the app rapidly increased to over 1.8 million, so almost ½ of all smartphones users had MobilePay installed on their phone.⁶³ This also meant 40% of the paying demographic had installed the MobilePay app, showing the support of the public towards a 'cashless' country.⁶⁴

Lets see how these plans develop.

Appendix I

Black/Shadow economy

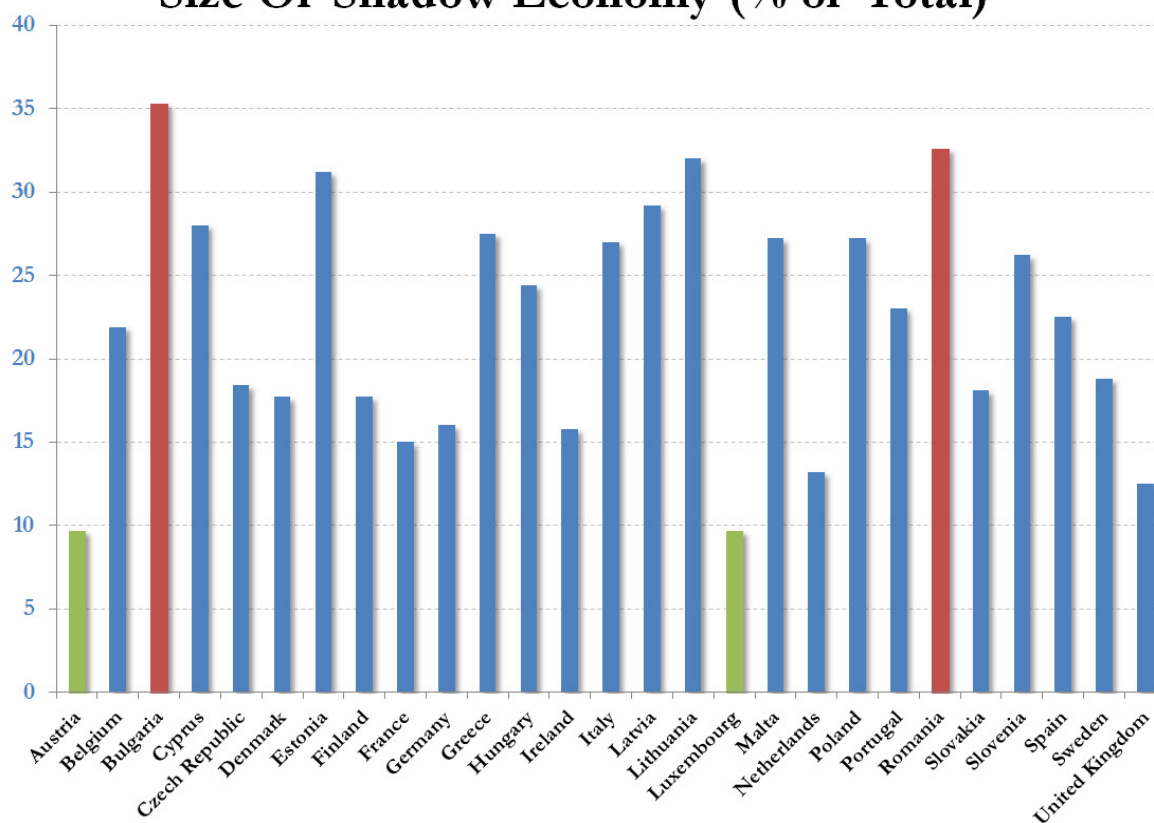
The need for cash is heavily supported by the black or shadow economy here we will try and document the regional dynamics of the black or shadow economy.

Shadow economy - the part of an economy involving goods and services which are paid for in cash, and therefore not declared for tax.⁶⁷

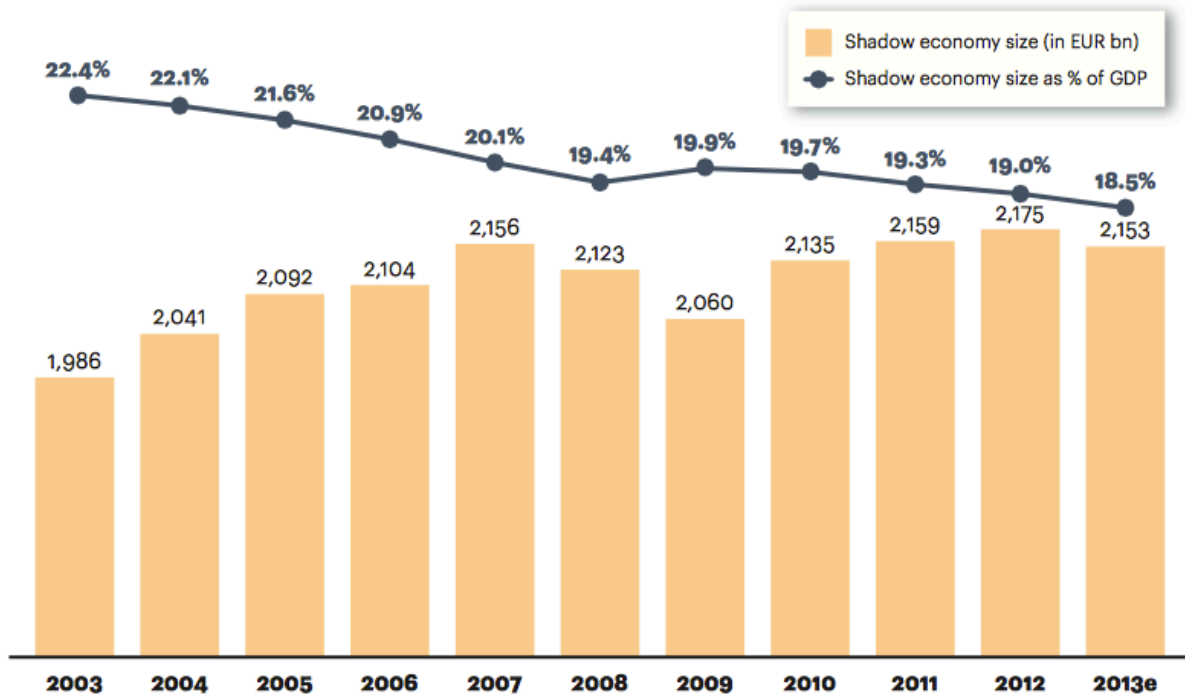
- The size of the shadow economy in Europe reached a 10-year low in 2013, and is now estimated at €2.15 trillion.⁶⁸
- On average across Europe, the shadow economy is as large as 18.5% of economic activity.⁶⁸
- Increasing electronic payments by 10% annually for at least four consecutive years can shrink the shadow economy by up to 5%.⁶⁸

69, 71

Size Of Shadow Economy (% of Total)

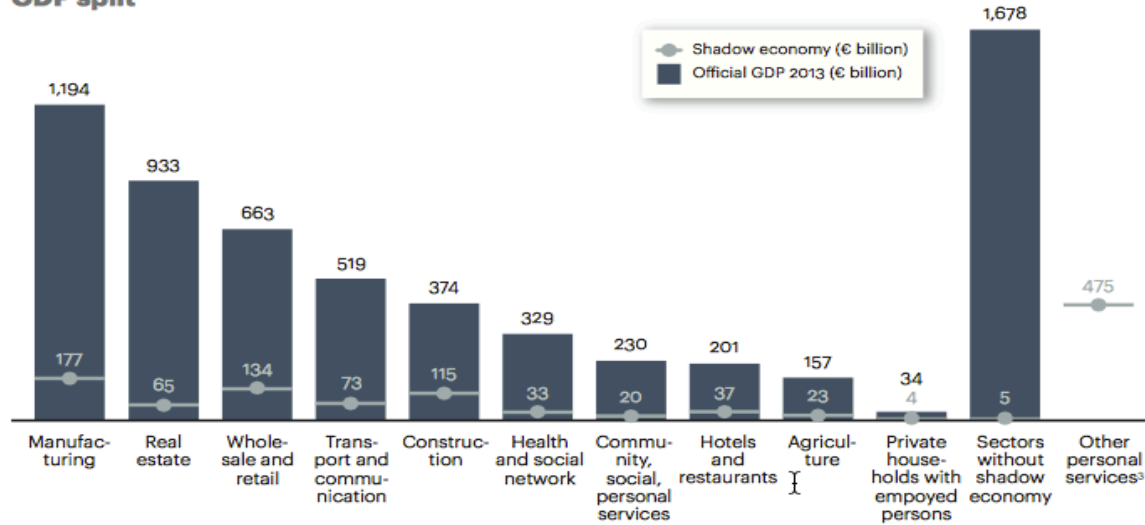


The development of the shadow economy in Europe



Manufacturing, construction, and wholesale and retail have the highest share of shadow economy

GDP split



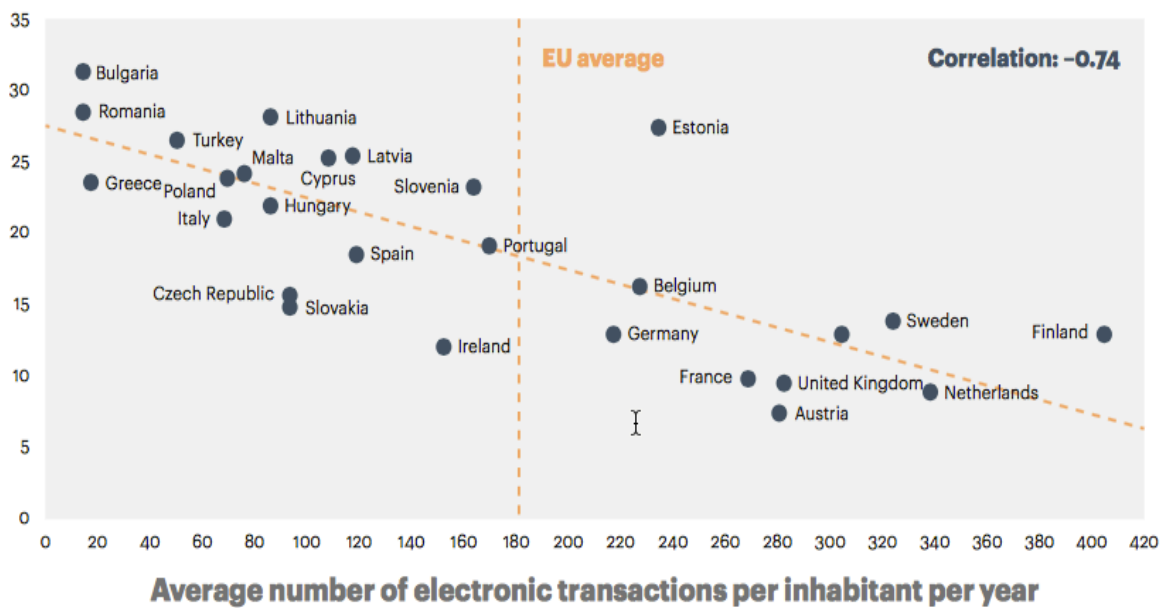
Shadow economy as % of sector

15%	7%	20%	14%	31%	10%	9%	19%	15%	12%	-	-
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Countries with more electronic payments have smaller shadow economies

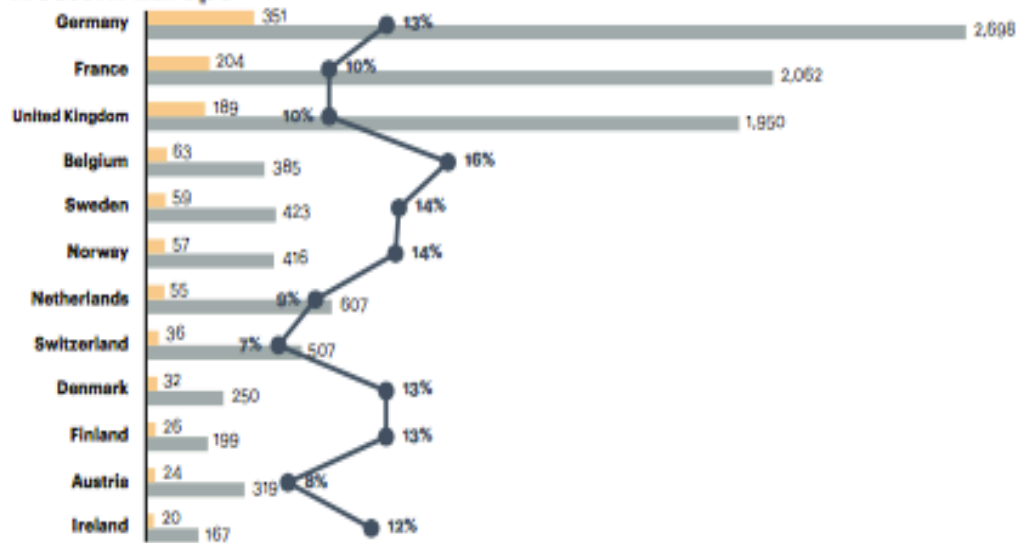
Share of shadow economy

(% of GDP)

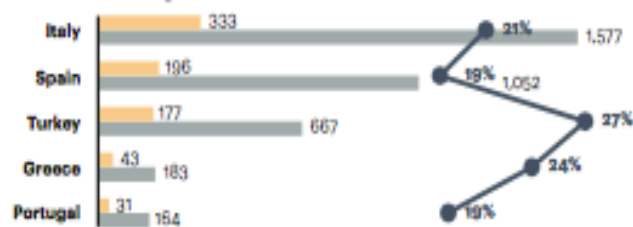


The shadow economy in relation to GDP

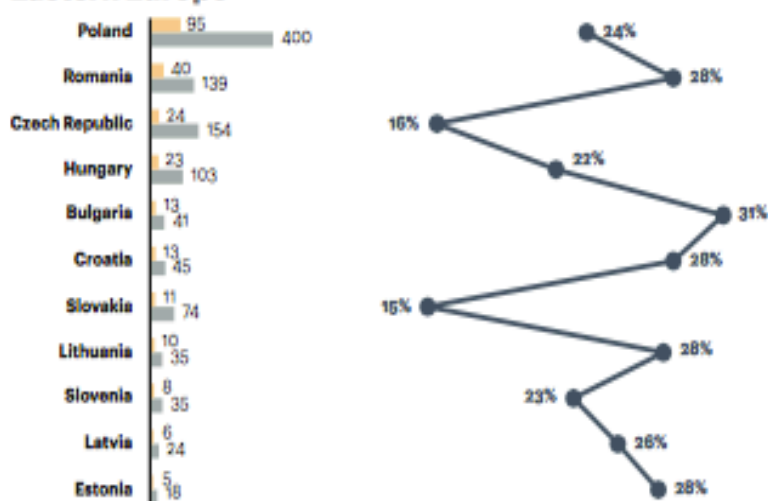
Western Europe



Southern Europe



Eastern Europe



European average: 18.5%

Shadow economy size (€ billion)
 Official GDP (€ billion)
 Shadow economy size (% of GDP)

Reference list

1. <http://www.mobilepaymentstoday.com/other/study-cash-falling-behind-debit-credit-volumes-at-the-pos/>
2. <http://www.atmmarketplace.com/news/global-cash-demand-outstrips-economic-growth-study-shows/>
3. <http://www.bankrate.com/finance/checking/will-cash-become-extinct.aspx>
4. <http://www.bankrate.com/financing/banking/is-cash-nearing-extinction/comment-page-2/>
5. <http://www.bankrate.com/financing/wealth/cash-is-king-for-millennials/>
6. <http://www.euromoney.com/Article/3090149/Technology-take-off-threatens-bank-foundations.html?p=2>
7. <http://www.nytimes.com/2014/11/29/upshot/cashless-society-its-already-coming.html?abt=0002&abg=0>
8. <http://www.informationweek.com/mobile/mobile-applications/mobile-payments-wont-replace-cards-and-cash-anytime-soon/a/d-id/1318006>
9. <http://www.gobankingrates.com/banking/mobile-payments-never-replace-cash/>
10. <http://www.paymentsleader.com/does-apple-pay-replace-the-plastic-in-your-wallet/>
11. <http://cloudtweaks.com/2014/10/will-coin-plastc-apple-pay-replace-wallet/>
12. <http://raconteur.net/technology/can-mobile-wallets-win>
13. <http://www.pressreader.com/usa/the-mercury-pottstown-pa/20150622/282136405052168/TextView>
14. http://www.al.com/business/index.ssf/2015/06/pay_by_phone_apps_apple_pay_g_o.html
15. <http://www.forbes.com/sites/paularosenblum/2014/12/22/apple-pay-2015-still-early-but-dense-clouds-will-eventually-yield-a-rain-of-adoption/>



16. <http://moneymorning.com/2015/01/27/apple-pay-aapl-potential-is-huge-especially-for-this-chip-maker/>
17. <http://www.theverge.com/2015/5/28/8661867/google-introduces-android-pay-replace-wallet-app>
18. <http://disruptiveviews.com/analysis-the-impact-of-android-pay/>
19. <http://www.netsize.com/online-stores-and-retailers-should-look-beyond-the-card/>
20. <http://contactlessintelligence.com/2015/03/31/uk-is-the-global-leader-in-contactless-cards/>
21. <http://eandt.theiet.org/magazine/2013/07/new-ways-to-pay.cfm>
22. <http://www.theguardian.com/money/2012/sep/14/contactless-payments-cash-free-shopping>
23. <http://www.retailmerchantservices.co.uk/blog/contactless-poised-to-kill-off-cash-how-will-this-impact-smes>
24. <http://news.alaric.com/industry-news/payments/cash-on-the-way-out-notes-and-coins-lose-out-to-contactless/>
25. <http://www.mobilepaymentstoday.com/blogs/how-apple-killed-the-digital-wallet/>
26. <http://www.mediapost.com/publications/article/217665/credit-cards-and-cash-still-favored-over-digital-w.html>
27. <http://www.accourt.com/uk-shuns-cash-as-cards-dominate-payment-market/>
28. <http://www.fastcoexist.com/1679476/the-problems-of-cash-would-we-be-better-off-sticking-to-plastic>
29. <http://www.cnet.com/news/samsung-pay-takes-on-apple-pay-as-mobile-payments-war-heats-up/>
30. <http://www.cio.com/article/2890887/samsung/how-samsung-pay-works-nfc-mst-security-faqs.html>
31. <http://www.digitaltrends.com/mobile/apple-pay-partners-news/>
32. <http://www.theverge.com/2014/12/16/7401187/apple-pay-expands-supports-90-percent-of-credit-card-volume-in-US>





33. <http://www.jpost.com/Business/Business-News/Government-approves-committee-to-reduce-use-of-cash-326399>
34. <http://www.news.com.au/finance/economy/denmark-is-set-to-become-the-first-country-in-the-world-to-make-cash-payments-obsolete/story-e6frflo9-1227346193452>
35. <http://www.cbsnews.com/news/sweden-moving-towards-cashless-economy/>
36. https://en.wikipedia.org/wiki/Merchant_Customer_Exchange
37. http://www.kioskmarketplace.com/articles/are-atms-on-their-death-bed/?utm_source=NetWorld%20Alliance
38. <http://motherboard.vice.com/read/the-death-of-the-atm>
39. <http://www.smithsonianmag.com/history/atm-dead-long-live-atm-180953838/?no-ist=&page=2>
40. <http://tradecurrencynow.com/forex-trading-help-blog/index.php/2011/11/which-country-has-the-highest-amount-of-currency-in-circulation/>
41. <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2214rank.html>
42. https://www.frbervices.org/files/communications/pdf/research/2013_payments_study_summary.pdf
43. <http://www.bloomberg.com/news/articles/2015-02-13/mobile-payment-fraud-is-becoming-a-pricey-problem>
44. <http://pos-software.cougarmtn.com/the-pros-and-cons-of-mobile-payments/>
45. <http://www.mobilepaymentstoday.com/articles/the-merchants-role-in-mobile-fraud/>
46. http://www.huffingtonpost.com/jerome-cle/mobile-payments-fraud_b_4276480.html
47. <http://expandedramblings.com/index.php/paypal-statistics/>
48. <https://www.atmia.com/files/Conferences/2015%20European%20ATMs/Speaker%20Presentations/Tapping%20and%20Fabulous%20PDF%20v1.pdf>



49. <http://www.statista.com/statistics/324684/global-mobile-payment-volume-percentage/>
50. <http://thefinancialbrand.com/39408/consumer-cash-usage-banking-payment-research/>
51. <http://www.omlis.com/omlis-media-room/worldwide-use-of-mobile-payments/>
52. <https://www.ecb.europa.eu/press/pr/date/2013/html/pr130910.en.html>
53. http://www.huffingtonpost.com/2012/06/07/credit-card-payments-growth_n_1575417.html
54. <http://www.finextra.com/news/fullstory.aspx?newsitemid=27575>
55. <http://www.ft.com/cms/s/0/a7dc2cfc-9fa0-11e3-94f3-00144feab7de.html#axzz3fNg8eI2H>
56. <http://mashable.com/category/mobile-payments/>
57. <https://www.credit-suisse.com/uk/en/news-and-expertise/news/banking.article.html/article/pwp/news-and-expertise/2015/03/en/sweden-we-dont-accept-cash.html>
58. <http://www.theguardian.com/world/2014/nov/11/welcome-sweden-electronic-money-not-so-funny>
59. [Mike Lee, CEO, ATMIA \(South Africa\) - Recent Global Cash Demand Study: 2009 - 2013](#)
60. <http://www.theguardian.com/business/2014/jan/15/zapp-app-millions-shoppers-pay-smartphone>
61. <http://www.essentialretail.com/news/article/559bf063bf384-barclays-pingit-joins-list-of-zapps-pay-by-bank-app-partners>
62. <https://www.danskebank.com/en-uk/press/news/news-archives/pages/new-payment-solution-in-denmark.aspx>
63. <https://trifork.com/?portfolio=mobilepay>
64. <http://www.digitaltrends.com/cool-tech/denmark-going-cashless-emonney/>
65. http://www.zapp.co.uk/?language=en-uk&utm_source=Essential+Retail&utm_medium=article&utm_campaign=RBTE





- 66. <https://danskebank.dk/en-dk/Personal/ways-to-bank/Pages/MobilePay.aspx>
- 67. <http://www.businessdictionary.com/definition/shadow-economy.htm>
- 68. <https://www.atkearney.com/documents/10192/1743816/The+Shadow+Economy+in+Europe+2013.pdf>