Trends in Mobile Payments in Developing and Advanced Economies

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As mobile phones have become commonplace throughout the world there has been an increasing focus on their potential use for making payments. Adoption of mobile payments in developing economies has occurred well ahead of that in advanced economies, reflecting the particularly large benefits these systems can provide in some economies. Advanced economies, including Australia, are now seeing the emergence of mobile payments, but generally following very different models to those that have become popular in developing economies. This divergence highlights the fact that mobile payments encompass a range of quite different payment types, each of which appeals in different circumstances.

Introduction

The widespread adoption of mobile phones and other mobile communications devices throughout the world has had a significant social and economic impact and is likely to continue to do so for some years to come. One area of mobile activity that has become a focus in recent times is the use of mobile phones for making payments. The adoption of mobile payments globally has followed a path unlike almost any other technological development, with rapid take-up in some developing economies, while advanced economies have been slower to follow. This largely reflects the fact that specific types of mobile payments have offered dramatic benefits to developing economies in terms of financial inclusion and payments system efficiency, while in advanced economies, where there is ready access to financial services, the case for adoption of those payment types has been less clear. In the advanced economies, use of mobile payments is likely to be driven by different mobile payment models that rely on newer mobile phone and network technology that is only now becoming more widely available.

This highlights the fact that mobile payments should not be thought of as a single payment type; the term encompasses a range of different classes and subclasses of payments, each offering a quite different set of benefits.

This article explains the various models of mobile payments, how adoption is evolving differently in diverse parts of the world and briefly touches on what might lie ahead for mobile payments in Australia.

What are Mobile Payments?

'Mobile payments' refers to a variety of financial transactions initiated with a mobile device. This might range from a remittance sent to a person some distance from the sender using only the services of the mobile network operator, to a 'credit card' transaction made at a retail outlet utilising a contactless chip in the phone.[1] The very different models for mobile payments can lead to confusion in the discussion of payment trends, which is made

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1   This article uses 'credit card', 'debit card' and 'prepaid card' to refer to transactions that are made via a card payment scheme (such as eftpos, MasterCard or Visa) even though, when made with a mobile phone, a physical card is not used.

worse by sometimes inconsistent and overlapping use of the terminology to describe some payment types.[2]

In order to properly understand the disparate payment types that fall under the banner of mobile payments, it is helpful to consider several aspects of those payments, including the economic purpose of the payment, the technological interface used, the funding source and the payment network type. These are described briefly below.

Economic purpose

Mobile payments facilitate two broad types of economic and financial activity:

- *purchases*: that is, payments in exchange for goods and services

- *transfers/remittances*: that is, payments that do not create an obligation for (or extinguish an obligation to) another party.

Purchases might be further broken down into point-of-sale purchases, where the payer and the payee are in the same location and typically interact via a payment terminal, and remote purchases, where the payer and payee are in different locations. Mobile *point-of-sale purchases* might include making a 'credit card' or 'debit card' payment using a contactless chip in a mobile phone or by sending a Short Message Service (SMS) instruction to make a purchase from a vending machine using the same account. The use by a small merchant of a device attached to a mobile phone to accept a card payment for goods and services might also be considered a mobile point-of-sale transaction, though the focus of this article is the use of mobile phones for the initiation of payments.

A *remote purchase* might involve a traditional payment type (such as a 'card' payment, BPAY or 'pay anyone' transaction) initiated via mobile internet or a payment initiated via SMS from a prepaid account held with a network operator of some type ('mobile money').

Mobile *transfers/remittances* are common in developing economies. This includes both domestic and cross-border worker remittances, often based on a mobile money model. In Australia, some banks and PayPal have also begun offering personal transfers via mobile applications on smartphones.

Technological interface

There are three main ways to initiate payments on a mobile device:

- *SMS* or *Unstructured Supplementary Service Data* (USSD), where a message is sent by the user via the mobile phone network to initiate a payment.[3] While SMS- and USSD-initiated payments can be used for purchases, including at the point of sale, these types of systems are more commonly used for remote money transfer payments (i.e. domestic and international remittances).

- *Mobile internet*, where the mobile device provides a means of accessing the internet. Payments via this transaction interface are similar to transactions made from a personal computer, but website services (including internet banking) can be tailored to make them more suitable for a mobile environment through the provision of a dedicated application ('app').

- *Contactless or Near Field Communication* (NFC), where a mobile device enabled with an NFC chip is placed in proximity to an NFC-enabled terminal and transmits payment information using radio frequencies. Communication between the devices can offer the same basic functionality as a contactless credit or debit card or a more complex interaction to allow additional services to be provided.

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2   In this article, 'mobile money' is used to describe Short Message Service (SMS) and Unstructured Supplementary Service Data (USSD) based systems that access stored value funds, typically managed by a telecommunications provider. 'Mobile banking' refers to software applications ('apps') provided by financial institutions for internet-enabled smartphones or tablets, where some of the main features include the ability to make person-to-person funds transfers and access to other banking-related services. 'Mobile wallet' here refers to apps for smartphones that package together several mobile payment types. The same term is often used in developing countries to refer to 'mobile money'.

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3   USSD is a mobile messaging service, which, unlike SMS, exchanges messages in a real-time 'open session'.

Funding source

The funds utilised in a mobile payment generally come from one of three sources – a credit account with a financial institution, a deposit account with a financial institution (including a 'prepaid card' account), or funds held in store with another entity (i.e. 'stored value funds', which in many cases are held by a mobile network operator).[4]

Payment network

Where mobile payments are between accounts held with financial institutions, they are able to utilise traditional interbank payment networks. For instance, they can be drawn from a deposit account via the Direct Entry system which underpins internet 'pay anyone' transactions in Australia. Payments from credit, debit or financial-institution-based prepaid accounts could also be processed via the card scheme networks used for traditional card transactions (for instance MasterCard or Visa).

Other systems utilise a 'closed' network, that is, where all those wishing to send and receive payments via that system must hold an account within it. This might be the case for a system where prepaid funds are held with a telecommunications provider. Such systems are simpler to establish because they do not require funds to be passed between different entities and therefore do not require cooperation with other parties.

The range of characteristics of mobile payment systems is illustrated in Table 1. Combining these characteristics in different ways leads to a wide range of possible mobile payment models. Which model is adopted will depend on the purpose of the transaction, the technology that is available in mobile handsets, networks and point-of-sale terminals, and, importantly, the level of access users have to traditional financial infrastructure. The latter may dictate whether the solution is largely delivered by traditional financial institutions and networks, or whether it is provided outside the traditional financial system. The importance of this is explored in the next section.

Global Differences in the Adoption of Mobile Payments

Developing economies

The first wave of mobile payment systems around the world were based predominantly on a 'mobile money' model – funds held with the mobile carrier, with transfers initiated via SMS or USSD. This was a relatively simple extension of existing prepaid mobile services, given that the carrier was already holding stored value on behalf of customers. This model has gained relatively little traction in economies with mature payment systems, but appears to have been more relevant in many developing economies,

Table 1: Characteristics of Mobile Payment Systems

Economic purpose	Technological interface	Funding source	Payment network
Purchase – point of sale – remote Transfer/remittance	SMS/USSD Mobile internet (apps) Contactless (NFC)	Financial institution – deposit account – credit account – prepaid card Other stored value (e.g. with mobile operator)	Interbank network (e.g. Direct Entry) Card scheme network (e.g. MasterCard, Visa) Closed loop (e.g. mobile operator)

Source: RBA

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4   Credit from a mobile phone operator via a post-paid account is also possible, but is less common.

where there has been a proliferation of systems and rapid, though inconsistent, take-up by consumers.

According to the GSM Association (GSMA) there are 163 mobile payments products operating in developing economies today, with around another 107 planned (GSMA 2013). Of those, around 90 are operating in Africa, with around 40 in the Asia-Pacific region and 17 systems in the Americas. A survey of 78 service providers in 49 developing economies reported 82 million customers as at June 2012 (30 million of them active), with six service providers reporting that they individually had more than one million active customers (Pénicaud 2013). However, adoption rates vary; in 2011 the majority of mobile transactions reported were conducted through the highly successful M-Pesa system in Kenya (Davidson and Pénicaud 2012), where 73 per cent of people use mobile money and 23 per cent do so at least once a day (Demombynes and Thegeya 2012). Other very successful developing country systems have been Smart Money in the Philippines (Smart 2012), which has over 10 million subscribers, and M-Pesa in Tanzania, which has a reported 4.4 million subscribers (Awad 2012). Table 2 describes a sample of the mobile payment systems that have been deployed in developing economies.

The rapid adoption of mobile money systems in developing economies reflects the benefits they can offer in countries where a large proportion of the population do not have an account at a financial institution or where underdeveloped financial infrastructure means that there is limited access to convenient and affordable financial services.[5] For instance, in some regions it is not possible for financial institutions to provide networks of branches and ATMs profitably (e.g. where relatively small populations are dispersed across remote areas). In these cases, mobile payments improve financial inclusion and provide a relatively efficient electronic

payment system quickly and economically. This is possible because, while financial infrastructure may be underdeveloped, adoption of mobile phones has grown rapidly in recent years. For instance, while sub-Saharan Africa still has relatively low mobile adoption rates, there were an estimated 53 mobile phone subscriptions per 100 people in 2011, compared with 18 subscriptions per 100 people in 2006 (World Bank 2012). Mobile phone ownership is typically supported by an extensive network of agents for the mobile provider. This can facilitate the adoption of mobile payments, because funds can typically be paid in by cash via an agent and can be withdrawn by the recipient in the same way.

While many mobile payment systems in developing economies rely on customers holding stored value with the mobile phone operator, some systems use the same SMS/USSD interface to initiate payments between accounts held with financial institutions. This allows the banking system to achieve a wider reach where extensive branch networks are not possible.

Mobile money systems in developing economies are predominantly used for funds transfer, with over 80 per cent of the value of transactions processed in such systems related to person-to-person transactions (Pénicaud 2013). This highlights the growing role of mobile payments in facilitating domestic remittances (for instance, from urban to rural areas) and international remittances in a more accessible, efficient and affordable way than established methods. Nonetheless, a number of mobile systems have also been established in developing countries to facilitate point-of-sale purchases and remote consumer-to-business payments via mobile devices. A mobile device allows people in remote locations to make transactions without using cash, which can be difficult to obtain and risky to hold in large sums. Furthermore, mobile devices can be used to pay for necessities such as electricity remotely without the payer having to travel to make the payment or arrange payment through a third party.

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5 There are strong disparities across countries in the use of financial services, with around 90 per cent of adults in high-income countries having a bank account, compared with around 40 per cent in low-income countries, though this share varies considerably across low-income countries (Demirguc-Kunt and Klapper 2012).

Table 2: Examples of Mobile Payment Systems in Developing Economies

Product/Operator	Model	Description
M-Pesa/Safaricom (Kenya)	Stored value funds and an extensive network of agents. Funds are pooled and stored in a trust fund at a bank.	M-Pesa enables consumers to make personal transfers, ATM withdrawals, pay bills, make point-of-sale purchases and top-up their mobile phone account. Partnered with Western Union to allow M-Pesa customers to receive international remittances.
Wizzit/A Division of the South African Bank of Athens Limited (South Africa)	Branchless banking service that customers access through their mobile phone via USSD. Operates through a network of agents, with no formal branch network.	Wizzit offers a broad range of services, including: personal transfers, mobile phone account top-up, and electricity vouchers. Customers also receive a Maestro-branded debit card and access to internet banking.
Smart Money/Smart (Philippines)	Stored value funds, stored under the customer's name in a bank.	Enables customers to make personal transfers, bill payments, top up a mobile phone account and receive international remittances. Customers also receive a linked MasterCard for ATM access to stored funds and for point-of-sale purchases.
Digicel Mobile Money/Digicel (Samoa, Fiji, Tonga)	Stored value funds system operating in a number of Pacific island nations. A network of agents is used (e.g. Post Fiji and bank branches) and funds are held in trust accounts.	Allows customers to make person-to-person payments, top up their mobile phone account, pay their mobile phone bill and receive international remittances. For the latter, the remittance sender in Australia or New Zealand loads funds via a credit card or bank transfer. Remittance receivers receive an SMS when the funds arrive.
MiCash/Nationwide Microbank (Papua New Guinea)	Bank account operated through mobile phone.	Customers can top up their mobile phone account, check balances and make personal transfer payments. Deposits and withdrawals occur through branches or a network of agents.

Sources: Digicel; GSMA; Mas and Kumar (2008); Nationwide Microbank; RBA; Safaricom; Smart; Wizzit

The potential significance of mobile money systems to developing economies extends beyond the financial sector to the broader economy. A more accessible, effective and efficient financial system helps to facilitate economic activity by lowering transaction costs. The potential advantages have led international organisations such as the Asian Development Bank, United Nations and the World Bank to take a significant role in facilitating the development of mobile payment systems, along with programs to ensure the development of suitable legal frameworks and regulatory arrangements to support these systems.[6]

Advanced economies

In the advanced economies consumers and businesses typically already have access to established electronic payment systems. This means that there is less need for the types of mobile payment systems that are popular in developing countries. For example, the Consumer Payments Use Study conducted by Roy Morgan Research on behalf of the Reserve Bank in 2010 indicated that at that time around 10 per cent of consumers had made what they considered to be a mobile payment, but that those were mainly to purchase ringtones, games or applications for their phone, rather than for a broader range of goods and services (Bagnall, Chong and Smith 2011).

The fact that 'mobile money' has not yet presented a compelling case in Australia and other advanced economies does not mean that mobile payments more generally are not relevant.[7] Adoption of other forms of mobile payments is occurring and the rate of adoption may pick up in the future, particularly mobile internet and contactless (NFC)

transactions. Both are reliant on the availability of supporting technologies, such as smartphones and NFC-enabled handsets and point-of-sale terminals.

Mobile internet access has allowed the widespread adoption of mobile banking applications offered by financial institutions, with some banks now reporting more connections to their systems via a mobile device than other means. While these offer broader account management services, a key selling point is often their payment capabilities. At present, these tend to focus on traditional payment methods such as BPAY and 'pay anyone' transactions, but in some cases more streamlined person-to-person payment applications are available, including where customers of the same financial institution can receive funds in real time. While mobile internet access can readily support stored value systems where funds are held by a party that is not a financial institution, transactions typically occur directly via a financial institution. Nonetheless, some non-traditional players, such as PayPal, are making inroads via their own mobile payment applications.

Contactless payments, available through an NFC chip, allow for point-of-sale payments initiated via a mobile phone. In this case, the phone itself would be presented to the reader at the contactless terminal to make a payment, rather than a card. Contactless readers are now widely available in Australia, though the handset technology required for seamless deployment of mobile contactless payments has lagged somewhat. One bank has sought to facilitate contactless purchases through the use of a special phone case, while other pilot programs to incorporate NFC payment capabilities in handsets are also underway. An alternative model that does not rely on NFC uses a combination of mobile internet and geo-location services (that the customer can use to 'check-in' to nearby stores and identify themselves at the checkout) to effect a transaction.

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6   For example, a number of multilateral organisations, including the United Nations, through the Pacific Financial Inclusion Programme (PFIP), supported the rollout of Digicel's Mobile Money product in Fiji, Samoa and Tonga. This program also supported the rollout of Vodafone's M-Paisa system in Fiji.

7   Japan is a significant exception to the low take-up of mobile money systems in advanced economies. NTT Docomo's Osaifu Keitai ('wallet mobile') has been widely adopted. According to NTT Docomo there are 36 million Osaifu-Keitai equipped mobile phones in Japan.

Mobile NFC is an interface which can facilitate a number of different types of transaction (see discussion of mobile wallets below), but it is likely that initial applications will once again feature traditional account-based products, processed through traditional card scheme networks. Table 3 outlines a number of types of mobile payment systems available in advanced economies.

Table 3: Examples of Mobile Payment Systems in Advanced Economies

Product	Description
Mobile banking apps (Australia)	Most Australian banks have mobile banking applications that allow typical online banking transactions, such as bill payments, internet transfers and balance checking, optimised for mobile phones. In addition, some banking apps allow person-to-person payments addressed using a mobile phone number, email or Facebook. One bank also allows mobile NFC payments to be made with a specialised phone case.
PayPal (Australia, United States)	Customers can link bank accounts, credit or debit cards or use funds in a PayPal account to make purchases in store or online. Instore payments can be made by using a mobile phone to 'check in' to a nearby store; the customer's name and photo will be displayed at the checkout for a PayPal payment to be automatically processed. Customers can make personal transfers, addressed to either the recipient's email or phone number.
Google Wallet (United States)	Allows both online and point-of-sale purchases via various 'debit' and 'credit cards', including via NFC technology. At selected merchants, the payment, redemption of vouchers and accrual of rewards points are combined in a single transaction called SingleTap.
Square Wallet (United States)	Customers link a debit or credit card to their Square account. The consumer can open a tab on their mobile device for a nearby participating retail store and their name and photo appears at the store's terminal. Customers can then pay 'with their name'. Square has also enabled instore payments at one retailer by scanning a quick response (QR) code, sent to the mobile device, at the register.
Osaifu-Keitai ('Wallet Mobile') (Japan)	Osaifu-Keitai is a mobile wallet with NFC capabilities used for a variety of functions, including prepaid funds transactions, event and transport ticketing, membership and rewards schemes. It also facilitates the iD credit payment service, which enables subscribers to defer payment to a later date (similar to a charge card).

Sources: Google; NTT Docomo; PayPal; RBA; Square; Australian banks' websites

What Lies Ahead?

In advanced economies, mobile internet and mobile NFC payments are likely to evolve so as to provide incremental benefits in convenience for customers, rather than filling the types of gaps in financial infrastructure that have been the focus of mobile money systems in developing economies. Similar incremental benefits have been capable of spurring rapid take-up of mobile services; for example, mobile banking has been adopted rapidly, even though similar services have been available via desktop PCs for some time. Over time, smartphone-based offerings may have a greater impact by integrating non-payment services with payments and by bringing existing payment services into new environments; for instance, facilitating point-of-sale payment via systems that have previously been suitable only for remote payments (e.g. PayPal).

One development that might help to facilitate the latter process is the likely proliferation of 'mobile wallets' in the near future. This is where one party packages a number of mobile payment systems into a single application. 'Wallet' is a reference to the ability of the user to select between a number of payment options in a similar way that a person carrying a physical wallet might choose to pay with cash, debit card or credit card. While mobile wallets can facilitate mobile internet transactions, a major focus is likely to be facilitating multiple types of payment transactions using the phone's NFC chip. For these transactions, the cardholder's credentials must be held securely in the phone itself, similar to a chip on a payment card. A single wallet could provide access to a number of 'debit' and 'credit cards', potentially from different schemes and issuers, along with alternative payment systems, stored value and person-to-person payments. Wallets are likely to be coupled with ways of managing loyalty programs, coupons, receipts and even tickets for entertainment or transport.

The wallet itself could be provided by any number of parties. Globally, such products, or their precursors, are already being provided by financial institutions, card schemes, telecommunications carriers and mobile handset/operating system providers. At least initially there is likely to be vigorous competition for the provision of wallets, as this will influence both how different payment methods are presented to the customer and merchant, and which parties have control over associated data flows.

One important development in Australia over the coming years is the anticipated establishment of a new interbank payment system that will provide new capabilities well suited to mobile payments. In February 2013, payments industry representatives announced a proposal to establish the new system in response to the findings of the Payments System Board's Strategic Review of Innovation in the Payments System, which concluded in June 2012 (Real-Time Payments Committee 2013). The new system is intended to provide for: payments to be made with close to real-time availability of funds to accounts held with financial institutions; the use of simple identifiers to address payments (e.g. phone numbers rather than BSB and account numbers); and additional information to be transmitted with payments.[8] While some existing mobile internet systems can provide similar services within a closed system or a single financial institution, the new system will allow the same convenience for transactions between customers of different financial institutions. It is expected to be delivered in 2016 and is likely to be associated with a fresh round of innovation in mobile payments.

Conclusion

What are loosely described as mobile payments should in reality be thought of as a group of often unrelated payment types. The differences between them are important for understanding why mobile payments have tended to develop in different ways around the world. They are also important for understanding likely future trends and the policy implications of mobile payments. In developing

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8   A BSB number (originally 'bank, state, branch') is a six digit number used to identify where a financial institution account is held.

economies, the focus has been on encouraging financial inclusion through mobile payments and ensuring appropriate regulation of the new players offering deposit-like products that have emerged as a result. In advanced economies, where financial institutions and established payment networks are likely to continue to play a role, this is likely to be less of a focus. In Australia, the Bank and the payments industry are seeking to ensure that the interbank payments system will be able to support the future needs of mobile payments in whichever way they evolve. The Bank expects to see mobile payments become a tool to support competition, both between payment systems and between participants in those systems. ⩗

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