

Eltville

**On a Blank Slate: Cash and Cash Requirements for Future Currency Unions in Africa
and the Gulf**

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The usage, costs, and benefits of cash: Theory and evidence from macro and micro data
Bundesbank International Conference
Eltville, Germany
February 27-29, 2012

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ON A BLANK SLATE: CASH AND CASH REQUIREMENTS FOR FUTURE CURRENCY UNIONS**Russell Krueger***The usage, costs, and benefits of cash: Theory and evidence from macro and micro data***Bundesbank International Conference****Eltville, Germany****February 27-29, 2012**

The Bundesbank is providing a valuable service to future monetary unions by sponsoring this conference, which will help clarify future trends and challenges.

This paper reviews issues surrounding policies on currency and cash demand that will be faced by four currency unions being formed in Africa and the Gulf.

During the next half decade, four future currency unions² comprising 30 countries will set cash policy for their new unions and design their currencies. New union currencies will completely replace the preexisting national currencies, and all issues related to currency design, production, and use will be under consideration. Key issues that will be considered include overall cash demand, usage in low income and rural populations, cash durability and replacement under severe conditions, setting denominations, the coin-bill boundary, acceptability requirements, competition from cocirculating currencies, and competition from e-money. This list of issues facing new unions appears more demanding than those facing the European Monetary Institute when it was designing the new euro.

In undertaking these weighty tasks, each union begins with a blank slate on which they must write out their strategies for their currencies and cash policies. In doing so, four stages can be foreseen;

1. Understanding how cash policy for the Euroarea was handled and how cash issues for unions differ from those of single countries.
2. Adjusting lessons from the European experience to reflect the unique conditions, institutions, and policy frameworks in each region building new monetary unions.

² Currently, four regions (East African Community, Gulf Cooperation Council, Southern African Development Community, and West African Monetary Zone) have active programs to build new currency unions. The problems currently facing the Euroarea have caused each to modify elements of their programs, but have not caused them to defer their initiatives. Launches will be in 2016 at the earliest; thus, about five years preparatory work on cash and currency issues is envisioned, which roughly corresponds to the timeframe for development of euro cash.

3. Evaluating cash policies in future unions to reflect recent market and technical innovations – a key theme of this conference.
4. Anticipate innovations in cash and its use and make appropriate changes to the cash policies of the new unions.

This paper will review currency issues facing future unions. First, the process followed in Europe will be reviewed to provide a sense to new unions of the many tasks to address and resolve. The following section notes key differences likely in future unions, which will call for new answers. A third section covers the role of E-money as it may pertain to future unions – it is assumed that e-money will be an important part of the monetary arrangements for all future unions by their start-up dates six to ten years from now. The final section looks at the process ahead for future unions.

Two appendices follow that discuss of some specific issues that will face future unions – the impact of creation of new unions on the banknote printing and minting industries, and the possible role of e-money in facilitating the changeover to the new union currencies.

A. Creating the euro

The challenge

A country's currency has long been a symbol of the country's sovereignty. The creation of the European Monetary Union challenged the long-standing identity between a country and its currency. The new currency, the euro, would have to transcend national sentiments and provide a new transnational symbol of the new union.

A long, detailed process to create the euro was followed that dealt with three challenging issues – the technical requirements of a new currency, dealing with usage patterns for a bigger and more diverse economy than in any member country, and changing the perception of the currency to fit the concept of a new, unified Europe in which the single currency was to be the capstone.

A similar process will need to be followed by new unions – first, the usability requirements of the currency must be determined; second, technical aspects of currency design and production must be worked out in a process that can be expected to take at least 5 to 6 years; and third, the politically sensitive process of creating the image of the new currency will proceed. As was done on Europe, all these elements should be handled by a single committee or process to ensure a successful synthesis.

Creating the euro

The European Monetary Institute recognized that creating a new currency would be a long process and thus work began early in the planning process. The process from beginning to circulation of the new currency took about nine years. Work began in 1994 with the set up of the “Working Group on Printing and Issuing a European Banknote”, which was later called the Banknote Working Group (BNWG).

An early decision was that the euro banknote should be extremely high quality and that banknote production should be continually monitored and improved. This had many advantages – it encouraged acceptance, counterfeiting was discouraged, and use in vending machines and money handling machines was improved.

Development of high quality standards also facilitated the production of banknotes because most of the likely Euroarea countries produced their own banknotes. Each country had its own quality standards and security features; the purchasing power of each unit of national currency differed; denominations varied; and size, color, and designs differed. In contrast, the euro would be a common currency produced in multiple sites and the features and quality standards had to be specified in detail and tightly monitored. Thus, strict production standards were needed and the output of each of the printing facilities in different countries would be monitored to ensure quality. This quality assurance process was challenging given the tight production schedule and massive number of banknotes to be produced – little time existed to recover in the event of errors.

Reflecting the pan-European aspirations of the new currency, a decision was made that the new currency should be free of national symbols or references.³ The decision reflected an urge to convey the unity of the continent under the new currency and also avoid potential problems using banknotes in countries other than where they were issued. The name euro was selected because of its applicability in all member countries and because it was not named after any current or historical European currencies.

A deliberative, inclusive process was followed to design the new currency.⁴ The BNWG held a competition for design themes for the new currency. It collaborated with a group of central bank experts and external experts and set up a Theme Advisory Group. The Group’s terms of reference included evaluating themes that cover the family of seven planned banknotes and

³ Design of the new euro banknotes began prior to the decision to avoid any national identification or references. Initially, euro banknotes included a space to the lower left of the map of Europe where national identification could have been made. Instead, the first position on each note’s serial number is an alphabetic character that indicates the country that issued the banknote, but the public is generally unaware of this.

⁴ EMI Theme Selection Advisory Group. “Interim Report on the Selection of a Theme for the European Banknote Series.” 1994.

ensuring that each theme provides maximum protection against counterfeiting. The BNWG retained the right to modify or reject any recommendation. The Advisory Group was given 6 months to make recommendations so that the BNWG would have time to reach agreement within a one year time frame.

The Advisory Group was mandated to create themes that symbolize Europe and its unity in a visual presentation, be aware of sensitivities of EU countries that remain outside the euro system, meet legal requirements, and serve as a means of payment acceptable to the public. Moreover, themes had to be broadly acceptable throughout the EU, be legible and widely understood, avoid national or gender bias, and have an aesthetic appearance. Finally, because there would be a period in which the new currency would cocirculate with the national currencies, it would need to be immediately recognized and acceptable to the broad public. The European Union flag and stars were accepted as a widely recognized symbol that should be included on the banknotes.

In 1996, a design competition was held in which entries were solicited for a common design theme that would run through all denominations of bills. Forty-four entries were judged anonymously by a jury of marketing, design, and art history experts, which was followed by a public consultation. The final design decision was made in 1998, after which the technical production of the banknotes began.

Parallel to the work on visual design of the banknotes, work proceeded on security and anti-counterfeiting features of the banknotes. The sophistication of counterfeiters and the availability of technology capable of producing very high quality reproductions required using multiple security features. Some security features must be available for use by the public to routinely decide that banknotes are genuine. Other features are needed by vendors and cash handlers to verify currency during automatic processing. Some features based on sophisticated technologies were known only to authorities and used as ultimate tests of the authenticity of the currency.⁵

The ECB carefully investigated the usability features of the euro, including elements such as coin-banknote threshold, unit size, color, size, feel, machine acceptability, etc.

⁵ A general rule of cash design is that regardless of precautions ultimately counterfeiters can develop passable fake banknotes. However, this takes time, money, and involves risks. Banknote designers therefore include multiple security features to make the counterfeiting process as difficult and costly as possible and thus discourage production of passable counterfeits. The ECB established stringent rules and procedures to detect counterfeits and remove them from circulation and to document the extent of counterfeiting. Typically over time counterfeiting increases and it becomes necessary to introduce a new version of the currency, but counterfeiting of the euro banknotes has remained insignificant, which has permitted deferring introduction of a new generation of euro banknotes.

Coin-banknote threshold – An important aspect of currency use is the coin-banknote threshold, which is the where the break is made between the largest value coin and the smallest value banknote and the size of the gap between the largest coin and the smallest bill. The boundary is affected by usage patterns. For example, economies with large low-income populations will have many small cash transactions daily. Coins have better durability, but market traders often prefer small value banknotes that are lighter and easier to handle. In contrast, in Europe and Japan, high value coins facilitate use of coins for fairly large retail transactions. In other economies where currency is often dispensed in automatic teller machines, banknotes may be used very commonly with coins used primarily for making change.^{6 7}

Unit size – The purchasing power of one unit of the union currency needs to be decided to provide the nominal base to set all other banknotes and coins. The level should be set at a point that avoids heavy use of coins for everyday purchases and also avoids use of high denomination banknotes for small purchases, which will incur high costs to replace worn-out low value banknotes. Europe was able to examine the clustering of values of national units in terms of purchasing power, but this will be difficult where wide income differences exist between union member countries – a comfortable level in one country could be a nuisance in others.

Size and color – As noted above, Europe followed a careful process to assure that notes were clearly identifiable in use by size, color, and design.

Special needs – Consultations were held with the European Blind Union and special design features were added to assist visually impaired users. Color, denomination size, and tactile feel were adjusted to assist visually impaired users. For example, coins each differ in size, weight, thickness, and milling around the edge, all of which permit identification by the blind.

Durability – The durability of paper stock and the permanence of ink and security features were considered in designing the currency.

⁶ The coin-banknote gap in the Euroarea has been strongly criticized. At least four countries have requested one euro banknotes, and a majority of the European Parliament has also made this request. These criticisms may grow as lower income countries in East Europe join the Euroarea. In Slovakia for example, the euro banknote threshold is over seven times higher than for the koruna. (Kubusova, 2009) This type of issue will face new unions with countries with highly varied incomes.

⁷ The coin-banknote gap affects the legal issuance of currency because often central banks issue banknotes and national governments coins. This affects the balance sheets of the institutions, but more importantly affects the amount and distribution of seignorage.

ATM and cash handling machine acceptability – These were important features in Europe, where most currency is distributed by ATMs and banks routinely process currency by machine. These needs place a premium on high quality, durability, and cleanliness of the currency, which led to strict requirements that damaged or dirty currency be removed from circulation.

Vending machine use – The currency designers worked with suppliers of vending machines to ensure that machines could identify coins and banknotes, and conversely reject counterfeits, slugs, and noneuro coins. One standard achieved was the ability to identify banknotes regardless of which of the four possible ways the notes can be entered into the machine.

Languages – Banknotes will need to convey information in languages understood by users. For example, the original euro used the Latin and Greek alphabets for the abbreviation of the ECB, and Cyrillic characters were introduced when Bulgaria joined the EU in 2007.

Toxicity – Banknotes were expected to meet the most stringent European health and safety regulations. Tests were made on all denomination banknotes, all printers were investigated, and production materials were tested. This included investigations of the use of Tributyltin (TBT) as a possible danger to health of users that concluded that TBT was present at far too low levels to pose any threats. Investigations of nickel exposure from one and two euro coins have also been made.

The usability investigations cited above and others have resulted in production of very high quality banknotes and coins that robustly serve many purposes. Important considerations were use of the currency in Europe's high-income, highly automated environment. Elsewhere, very different income, environmental, and usage situations could result in different currency requirements than in Europe – an issue discussed further below.

Currency production

Two factors dominated decisions regarding the printing of euro banknotes and minting of coins – preexisting national printing presses and mints that politically could not be abandoned, and very high quality standards that required close oversight of the dispersed production of the currency. Initially, eleven printing sites were used, with each site specializing in production of a maximum of two denominations. Concentrating production in a limited number of centers made controls easier, helped coordinate production, helped ensure quality, was more secure, and kept costs down because of efficiencies of scale. These advantages helped produce a very large number of banknotes and coins under a tight production schedule. At the start of the union, each country was responsible for producing or obtaining the stock of currency needed.

Following the design process, final designs and technical specifications for the euro were set in February 1988, almost four years prior to circulation of the currency. Production of the printing materials began, including creating dies, films, holograms, and software files, based on manufacturing of printing plates from a single source. Arrangements were made in parallel to obtain raw materials and security devices. Materials needed to be continuously available and multiple sources were sought to avoid potential bottlenecks. Forty different suppliers of raw materials were involved.

Rather quickly, materials were gathered by September 1998 for test printing of several million banknotes under standard operating conditions. This test established the flow and quality of raw materials, tested the quality management system, and allowed examination of the output.

The initial production phase rested on efforts of the national central banks, which recognized that many of the countries had their own national printing operations that they wished to continue.⁸ Each country was responsible for producing or obtaining its own stock prior to the launch of the union. Banknotes could be obtained from other countries, or countries could pool efforts.

The ECB set initial production at 13 billion banknotes totaling about €600 billion in value.⁹ This included stocks for use by businesses and the public, which had to be distributed and in place throughout the union prior to the startup date. Small working stocks were provided to businesses and consumers beginning the month before startup, which was called “frontloading”. Reserve stocks also had to be in place to deal with unexpected demands. And finally, some currency had to be available to build working stocks in countries outside the Euroarea.

⁸ This was an application of the principle of “subsidiarity” enthroned in the Maastricht Treaty, which holds that many union functions should be performed on a decentralized basis by member countries in lieu of centralizing the work. Given the complexity of the union building process, subsidiarity greatly facilitated the start of the union by placing reliance on preexisting national capabilities rather than creating new centralized institutions and procedures – many centralized activities and institutions were introduced but less so than if subsidiarity had not been followed. However, a cost of subsidiarity is a greater burden to fashion and apply common rules and coordinate activities undertaken in multiple countries.

⁹ Estimates of the production run in total and by denomination depended on calculations to convert the stocks of national currencies into a common measure of value, which was possible because of the existence of the European Monetary Unit (EMU) (which provided conversion rates from national currencies into a common value) and an implicit assumption that the euro would be set to be equal to one EMU. The setting of the euro at par with the EMU was not formally agreed until just before the start of the union, but a rate at par or near to it had to be in mind well before then in order to produce the stock of banknotes and coins prior to the start of the union. Neither of these conditions will necessarily hold for future unions.

Advantages for the euro

This section reviews conditions for currency use and currency design and production in Europe that facilitated (mostly) or hindered introduction and current use of the euro. This section lists key advantages to illustrate the extent of challenges for future currency unions that will not share the same advantages. For future unions, the conditions on the ground, currency usage patterns, and how they interact with currency design, production, and cash management can be expected to be very different. Many of the usage issues listed below will be reexamined later in the paper to discuss plausible responses by future unions.

- The Euroarea began with many advantages – it is high income, relatively compact, has a large and competent bureaucracy, and has high literacy. Europe’s high income provided the collective wealth for governments, banks, businesses, and households to easily absorb the costs of transition to a new currency.
- Europe has a high population in a compact area, which provides efficiencies in introducing a new currency.
- Europe’s many languages created costs in communicating information about the new currency.
- The Euroarea is part of the larger European Union which handled heavy lifting in terms of setting the overarching legal and regulatory framework and promoting regional integration.
- The Euroarea is highly integrated and thus cash flows readily across national boundaries. Likewise, (although there was some fencing into national boundaries) financial institutions can operate freely across national boundaries to support free capital movement within the zone.
- A strong financial infrastructure existed that provided the broad range of financial services, including cash processing.
- The economies were highly integrated prior to the union start-up due to application of “convergence criteria”, which minimized prospects of disruptions due to introduction of the new currency.
- The public had easy access to banks and other formal financial facilities. ATM use was very heavy.
- The deutsche mark was the lead currency and was held for safekeeping or speculative purposes throughout the future Euroarea and especially outside the zone.

- Compactness, travel patterns, and vacations created large intra-zone currency flows, as well as flows outside the zone. In some cases, clear seasonal patterns of flows and return flows could be identified.
- Prior to the Euroarea, currency crises were regular features in Europe, which resulted in some speculative currency holdings.
- Advances in payments technology, including EU-mandated cross-border facilities, changed payments patterns and probably reduced the need for cash holdings.
- Credit card and E-money will affect future cash requirements and usage patterns.
- Anticipation of expansion of the Euroarea fostered holdings of euros in potential future members. In some cases, such as Poland, the euro supplanted dollar holdings to a large extent.
- High quality national printing presses and mints existed.
- Counterfeiting was an important, but not overwhelming problem. National authorities had preexisting partially successful programs to deal with counterfeiting. Counterfeiting of the euro has been limited and thus a new version has not had to be introduced.
- Underground and criminal activity existed, giving rise to unrecorded cash flows that often favored use of relatively high denomination banknotes.
- Hoarding existed for various purposes. Demand for very high denomination euro banknotes was strong, much of which may have gone into hoards to replace national currencies (especially the DM), the dollar, and other favored currencies.
- Cocirculation of non-eurozone currencies was limited.
- The euro existed for three years as a “virtual currency” used for government accounts, bank deposits, financial accounting, statistics, etc.. This transition period allowed banks, businesses, and the public to become familiar with the purchasing power of the euro prior to emission of physical currency.
- A modest upward spike in consumer prices occurred when physical euros were introduced.

- Conditions described above permitted the introduction of physical euros in a “Big Bang” that replaced national currencies within a short period, which minimized costs and confusion because of use of two currencies simultaneously.
- Finally, countries adopting the euro after the start of the union easily adopted it because they were very familiar with it due to tourism and other cross-border flows and already had working stocks.

The long list of conditions above contributed to successful and rapid introduction of the euro. Glitches were minor and the public quickly accepted the new currency and adjusted to it. However, as will be discussed in the next section, many of these conditions are absent in future unions. Many new solutions will need to be found and introduced simultaneously with the introduction of the new union currencies and all the changes in economic behavior that will accompany the start up of a monetary union.

B. Currency usage in future monetary unions

This section looks at issues associated with creation on new currencies in future monetary unions, where conditions differ greatly from those surrounding the euro. There are important implications for the design, production, and use of the new currencies. To take one salient example, E-money has become very important in some future union areas and new unions will need to directly consider its relevance to their overall cash policies – the next section provides a separate discussion of e-money.

The cash usage conditions of the four monetary unions now being formed differ greatly from those in Europe and indeed often from each other.

- Income and wealth – The three African unions include some of the poorest countries in the world, with high illiteracy, inadequate infrastructure, and under-trained and under-staffed bureaucracy. The costs of the transition to a new currency could be a major hurdle for central banks, governments, banks, businesses, and households. The Gulf region is a major exception where ample funds are available in total, but which might not be distributed in ways that can support the union project. In the GCC, subsidies may be possible for communities not able to easily absorb transition costs; subsidies in the other union projects are unlikely.
- Compactness – The EAC and GCC are compact and contiguous entities. The SADC and WAMZ areas in contrast are very widely dispersed, and in the case of WAMZ not even contiguous. Reaching rural populations will be an issue in all cases and a major problem for SADC and WAMZ.

- Languages – The EAC and GCC have simple language situations: information about the currency can be conveyed in English and Swahili and Arabic and English, respectively. The WAMZ might be able to operate only with English, but French and some native languages might also be considered. The SADC situation is very complex with English, French, Portuguese, and Afrikaans as official languages and with many native languages, some of which are quite widely used.
- Overarching frameworks – Each of the planned monetary unions exists within the context of more encompassing economic, political and social organizations. In all cases, institutions are less developed than in the EU and the powers of the regional bodies are less than those of the EU – whether the frameworks are sufficient to handle the full range of cash and currency issues remains to be seen. The GCC has deep political interrelationships and *de facto* leadership of Saudi Arabia in some areas could promote policy convergence.
- Economic and Financial Integration – The GCC countries have many economic and financial similarities, and economic convergence is well advanced. Formally, the national currencies can be used interchangeably, but actual cross-border use lags. The EAC has numerous areas of potential economic integration, but much more can be done. Excepting the SADC countries within the existing Common Monetary Area (CMA) where currencies trade at par, labor migration is extensive, and commerce flows via South Africa, integration in the SADC and WAMI is very limited.
- Convergence criteria – All regions have convergence requirements. Convergence in the GCC is well advanced¹⁰, is incomplete but progressing in the EAC, and a remaining challenge in the other two areas.
- In the new regions, much financial infrastructure remains to be built. For example, payments system development is underway, much supported by international assistance. As new systems many will be up to date with international standards, but systems are mostly national oriented and a transition to a regional basis will be needed.
- Public access to banks and other formal financial facilities such as ATMs is good in many areas of the GCC, but limited in rural areas. Access is a major problem in the other regions – a gap being filled by E-money.

¹⁰ See Kamar, B. and S. Ben Naceur. "GCC Monetary Union and the Degree of Macroeconomic Policy Coordination," IMF Working Paper 07/249, International Monetary Fund. 2007.

- Regarding cocirculation, in the GCC and SADC, the Saudi riyal and South African rand respectively might serve as lead currencies and be held for transactions, safekeeping, or speculative purposes throughout their regions. The Nigerian naira is clearly the dominant currency within its region, reflecting the size of Nigeria's economy within the zone, but it does not penetrate the other economies deeply.
- Intraregional labor travel is extensive in all the African unions which generates substantial flows of cash across borders.
- E-money will affect future cash requirements and usage patterns. One issue will be whether systems will be privately operated but regulated, or integrated into the official monetary system. Use of debit cards, credit cards, and prepaid cards for goods and services will increase – in some cases they will be in competition with e-money and in other cases will serve different purposes.
- Production of banknotes and coins will be largely outsourced to European or Asian firms, which may increase costs and restrict capacity in comparison to the situation in Europe, and there might be a lack of redundancy to overcome problems. Banknote printers exist in Nigeria and Kenya, and coins are produced by the South Africa mint. This is much more restricted than in Europe, but it does provide a basis for limited production of the new union currencies. Capacity can be built, both to produce mass quantities of low value banknotes and coins, but also to gradually incorporate high quality production and security features needed to produce top quality high value instruments.
- Counterfeiting will be a problem in all areas, but might be controllable. Contributing to the problem is that lower value banknotes will be heavily used largely outside the formal banking system, which means that they will deteriorate in use and thus security features will be obscured. Poor communications and illiteracy will make it hard to educate the public about currency security features.
- The role of underground and criminal activity affecting use of the new union currencies is unknown. Initially, it is possible that hoards of high denomination banknotes will be in foreign currencies, which would deny new unions of substantial seignorage income that countries issuing the euro were able to capture.
- For a variety of reasons, like the euro new union currencies might have initial periods as “virtual currencies” used for government accounts, bank deposits, financial accounting, statistics, etc.. This transition period allowed banks, businesses, and the public to become familiar with the purchasing power of the euro prior to emission of physical currency.

- Conditions in Europe that permitted the introduction of physical euros in a quick “Big Bang” may be absent in future unions that may face limited production capacity, large rural and isolated population, limited access to formal banking institutions, illiteracy, etc.. Future unions may need to seriously consider gradual introduction of the new currency on a cocirculating basis.
- The underlying real conversion rates of currencies into the new currencies will be less certain than in Europe where currencies were tied (although with some flexibility) to the ECU for long periods which permitted the European economies to integrate their price structures.

C. Electronic Money (e-money)

Electronic money comprises a variety of encoded measures of value used by computers or other electronic devices to store value and make transactions. To be deemed E-money, it must be usable for a broad range of transactions, and not be limited to transactions for a limited range of goods or services or firms. For example, cards used by transportation systems that store value that can only be used for travel on the system are not e-money, but prepayments for future services. In contrast, electronic stores of values that can be used for transactions with many different types of vendors are e-money. The boundaries are not always well defined. Many different devices could be used as carriers for the money – computers, mobile phones, swipe cards, electronic chips, and others.

The European Monetary Institute examined issues of possible use of e-money for the conduct of monetary policy in the Euroarea. In 1997, the EMI reviewed the state of work on electronic money and provided an opinion to the European Commission in March 1998 that electronic money would significantly affect monetary policy in the future and that rules governing its issuance are needed.¹¹

The EMI defined electronic money as an electronic store of monetary value on a technical device that may be widely used as a prepaid bearer instrument for making payments for undertakings other than with the issuer without necessarily involving bank accounts in the transactions. Such devices must operate as general purpose payment instruments. Another important criterion is whether value can be transferred between electronic money systems without involving banks to debit and recharge value to the device.

¹¹ EMI. “Opinion of the EMI Council on the issuance of electronic money” transmitted to the European Commission. March 2, 1998. EMI Annual Report 1997. pp. 74-75.

The EMI recognized that e-money could have monetary policy impacts - for example by substituting for use of physical currency and thus it raises monetary policy issues.

A wide variety of e-money devices are in place or proposed. Mobile phone-based systems, in which a means of storing value is linked with a communications device, are gaining wide acceptance.

- The e-money technology is linked to current communications practices and much physical infrastructure is already in place. Adoption can be rapid.
- This technology appears to be well suited to facilitate financial transactions in rural and developing areas where transportation is limited and few formal banking institutions exist.¹² Thus, electronic currency can be one component of development of banking systems that can reach many millions of people without access to formal bank facilities.
- Electronic money systems can be operated by computer companies or telecommunications companies as extensions of their existing businesses, which could dramatically change monetary conditions and create new types of monetary institutions.
- A group of mobile phone operators with networks in about 100 countries covering about 600 million customers have plans to set up systems for international transmission of remittances between cellphones. These arrangements will require linkages between international payments companies, such as Mastercharge, and between local banks and cell phone operators. It is expected that the high costs of international remittances can be dramatically cut and service will be quicker and more convenient.

Other types of e-money systems exist, such as for transfers over the internet or other special e-money devices. Moreover, simple prepaid cards often can be accepted by a wide range of vendors giving them a quasi-monetary role, and if they can be easily reloaded with value, it is hard to draw a sharp line between genuine e-money devices and close competitors. Thus, efforts to develop or regulate e-money systems should be viewed as covering a range of different channels and devices that will evolve quickly. This means that rules should be general to cover a range of systems and flexible enough to deal with innovations and new markets.

The wide availability of e-money could bring about major changes in the operation of money and financial markets. First, it can make access to financial markets available for much wider segments of populations, especially in less wealthy countries. Second, it competes with

¹² For example, in lieu of fixed line phone communications in Africa, there are an estimated 225 million mobile phone users who could potentially be provided payments services through cellphone e-money facilities. This is already reported to be commonly used by small traders and firms in West Africa. Kenya and Tanzania have adopted cellphone money transfer systems that are used by millions of customers.

banknotes and coins for use in transactions, which can cause structural changes in the demand for money and in seignorage. Third, new types of financial institutions could evolve to increase market competition, lower costs, support product innovation, and force changes in regulation and oversight. New instruments and changes in the channels of transmission may change monetary relationships in the economy and loosen the control of authorities over monetary conditions.

Moreover, new forms of risk could develop such as new forms of operational risk because of the use of sophisticated electronic systems to handle the e-money. Interoperability of systems will be needed to prevent the possibility of failures of transactions between operators of systems. Electronic theft or fraud must be treated as possibilities and security systems developed to deal with them. There could also be a wide range of new issuers or agents for e-money, which will require new rules to register them, supervise them, and guarantee their proper operation. Any lengthy breakdown of an e-money system, for example, after a natural disaster, could be economically disastrous.

E-money systems might compete in issuing money substitutes with the official monetary system based on use of central bank money and oversight by the central bank and other authorities. The central bank and government could lose their ability to control the monetary base and the monetary stock, with potentially major effects on monetary and economic policy. E-money also potentially threatens the seignorage income of government if it reduces demand for banknotes and coins.

Box: M-Pesa digital money system in Kenya

Several digital money schemes have developed in Africa, where they can occupy niches not being served by formal financial institutions. The M-Pesa system in Kenya has grown exceptionally quickly and has penetrated national financial markets deeply, including in rural areas where large parts of the population were not served by formal financial institutions. Many businesses and households have directly benefitted.

Importantly, M-pesa is not operated by the central bank or by a bank, but by Safaricom, a telecommunications company that originated the scheme to promote its mobile phone service. As such it fell outside of the preexisting regulatory authority of banks and thus a new regulatory framework is being developed.

M-pesa involves a widely dispersed system in which customers visit local agents to exchange cash for transferrable mobile phone credits (or conversely exchange credits for cash). Many small, village-level businesses have become agents, which provide access to wide swaths of the population to use the system. M-pesa has become widely used for commerce and remittances. It is commonly used for current depositing and transfers, including supporting large net flows of remittances from urban areas to rural areas. The agents carry out the daily cash netting operations and generate regular cash shipments through intermediaries who

interact with the bank that supports the system. The system has very quickly and strongly changed currency usage patterns and will have large, still-developing implications on cash management and on the formal financial system.

The system will have a major impact on monetary cash management policies, and also raises important operational and security risks. The important role of M-pesa as a payments institution for millions of customers requires that effective central bank oversight be established and that its practices be subject to regular audits and risk assessments. In sharp contrast to the situation for cash holdings, the operational risk of a breakdown of a mobile phone e-money system affecting commerce for millions of people must be effectively addressed and multiple layers of backup must be in place.

In light of such concerns above, in 1998 the ECB published the “Report on electronic money” that covered reasons for regulation of issuance of electronic money and issuers, the role of electronic money in payment and settlement systems, prudential supervision, and set out minimum requirements for electronic money systems;

- Issuers of electronic money must be subject to prudential supervision
- Issuance must be subject to sound and transparent legal arrangements
- Technical security must be assured, including the ability to detect counterfeits
- Protection against criminal abuse is needed
- Monetary statistics reporting is required and companies must supply whatever information is needed for monetary policy purposes
- Issuers of electronic money must be legally obliged upon request to redeem electronic money against central bank money at par
- Central banks can impose reserve requirements on all issuers of electronic money
- Electronic money systems should be interoperable, and
- Insurance, guarantees, or loss-sharing schemes are needed to protect the holders of electronic money.

This foundation work undertaken in Europe seems highly applicable for future unions. In Europe, e-money system development has been limited to date; in contrast, development in other regions has been extensive and the four current union projects will have to seriously address its role in their regions – more seriously than has been the case to date in the Euroarea.

- Interoperability and regional regulatory systems will be required. Diverse national systems that have developed will need to be merged or made interoperable and transactions and their clearing must be seamless across the union. In itself, this can promote financial integration of the member economies in much the same way as the euro integrated currency markets in Europe.

- E-money will affect monetary policy. At present, there is no consensus on the definition of e-money, how to measure it, how to aggregate it into money stock measures, and what its role will be in monetary policy. The linkage between e-money and standard monetary instruments must be very strong - from a policy perspective, e-money should operate as a single market linked with the official monetary market and without the possibility of the market operating with different liquidity or risk conditions from the overall market or between systems. The speed of growth of e-money in future union regions appears to be sufficiently rapid that it could generate major implications for monetary policy. The effort to investigate the implications for union monetary policy will find parallels in the process of designing the monetary policy framework for the Euroarea.
- E-money will affect monetary behavior and by serving as a new form of financial agent accelerating transactions, cutting costs, and supporting economic transactions that were previously not feasible could also affect real economic behavior.
- New channels of saving and investment could open up.
- E-money could be a key element of strategies to introduce the union currency as a virtual currency. Conversely, local agents for e-money systems could serve some of the functions performed by banks in Europe in retiring the old physical currency in exchange for the euro.
- In some cases, the union itself might choose to operate e-money systems itself in order to maintain tight controls, link conventional and e-money policies, and capture seignorage. Also, union sponsorship could be a means of gaining “buy-in” of businesses and the public to the new union and the new currency.

D. Closing Remarks

The creation of the euro provides many lessons for future monetary unions developing their currency policies. The new unions must understand what was done in Europe, why, and how their cash policies fit into the overall process of creating the monetary union. This provides a foundation to build their own systems, but this paper suggests that the building constructed on that foundation will look very different for several reasons, which include among others.

- The economies are quite different from Europe and currency use patterns differ.
- Many advantages that Europe had in creating the euro are lacking in other regions. Other regions face harder challenges that will require innovative solutions, which usually will also usually need to be less expensive than in Europe.
- Currency usage patterns will differ, which affects design features, cash management, and methods of transitioning to the new currency. Perhaps not in the Gulf, but in Africa relatively more low value banknotes will probably be needed.

- E-money is coming rapidly and to a far greater extent than in Europe. Policies for e-money and physical currency must be co-developed.
- Currency production facilities are far more limited and less sophisticated.
- The transition to a new currency will be much more difficult than in Europe because of stunted banking systems, dispersed and rural populations, and poverty and illiteracy.

The effort to create a new currency in future unions will be driven by the schedule to launch each union. The process in Europe took nine years to assess the user requirements for banknotes and coins, design the new currency, set up production, produce the stock of currency, establish the conversion rates from national currency into the union currency, and introduce the currency to the country. Three years of the process was dedicated to introduction of a virtual currency that set the stage for introduction of the physical currency.

The process in future unions could plausibly take that long. We could envision a process similar to that in Europe in which three full years were spent to produce the comprehensive plan for the union, after which the specific timetable for start-up could be set and the implementation process begun. Given the challenges future unions will face, especially those in Africa, three years of implementation work to create an operational virtual currency is plausible. In addition to what was done in Europe, new unions' *virtual currencies should also operate as a form of e-money on mobile phone systems.*¹³ The physical currency would be introduced in due course.

The start-up schedule above is longer than politicians in most future unions appear to want. There may be flexibility to speed up the process, but the technicians involved (the cash people among others) should not permit themselves to be pushed into a schedule that could jeopardize prospects for success in their respective fields, because a union can fail if not all pieces are in place and functioning well at the start of the union – individually, in conjunction with the other processes of the union, and at the union and national levels.

For the participants in this conference – the doers and thinkers on matters related to cash – the currency and cash issues in future unions need your attention. Help is needed to assess needs, design and produce the currency, integrate physical and virtual currencies, create a

¹³ An advantage of having mobile phone e-money during the virtual currency phase in which physical national currencies will still circulate is that the phone can simultaneously inform the user of value in both the national and union currencies.

cash management policy, and introduce the new currency. This will require analytical skills and technical expertise in different mixes at various phases of the process. Much of the work can be based on the experiences in Europe, but the work must also simultaneously deal with the different conditions affecting cash within each union and also insights on the role of cash in the future. These are challenges of the first degree – it can be hoped, with gratitude to the Bundesbank for sponsoring this conference, that participants (along with their governments and international bodies) will be willing to step forward and help future unions address them.

Appendix 1 – Impacts on the banknote printing and minting industries

The international banknote printing and minting industries could be dramatically affected by new monetary unions in Africa and the Gulf. Factors include greater uncertainties than in Europe, consolidation of the current highly fragmented market, and restructuring contracting processes.

Uncertainties

Future unions face greater uncertainties regarding banknote and coin production than was experienced in Europe. The uncertainties could affect costs and scheduling.

- Union-wide usage patterns have not yet been fully investigated. As has been emphasized in this paper, Europe can provide guidance on the types of usage factors to consider, but different conditions in each future union could result in different answers – printers and mints will need more specific guidance before serious currency design work can begin.
- In Europe, the likely start-up dates for the euro were fixed by treaty, but start-up dates in the future unions have not been firmly set, and one or more of the possible unions might not materialize. Printers and mints will be hesitant to undertake work “on spec” years before uncertain union start-up dates.
- Ultimate membership of the future unions is not settled.
- The conversion rates from national currencies into the union currency and the sizes of the nominal units have not yet been set, in contrast to Europe where the ECU provided guidance. Possibly, the Nigerian naira, Saudi riyal, and South African rand could serve as lead currencies for their respective unions for their regions, but no similar leader is available in East Africa. Until the conversion rates, nominal unit size, and coin-banknote gaps are set, the volume of production runs cannot be set.
- Unlike Europe, banknote and coin production will interact intimately with e-money conditions and potentially could result in less demand for physical cash in total or for specific denominations. Rapid evolution in the e-money industry complicates the picture.

Consolidation

Printing and minting markets for new unions differ greatly from those in Europe when the euro was created. Most potential Euroarea countries had existing public operations adequate for domestic demand that were converted to euro production under official surveillance. National officials had long experience and skills to undertake the transition in a timely, effective manner. In contrast, most African and Gulf countries rely on negotiated contracts with international printers and mints (Crane, de la Rue, Giesecke & Devrient, etc.), on whom

the countries are heavily dependent for printing capacity and expertise. As many as two dozen currencies could disappear to be replaced by a handful of larger currencies.

Renegotiation of printing and minting contracts

Contracts with existing currency producers will be renegotiated. Countries in a new union will begin with a diverse range of contracts for banknotes and coins with different conditions and costs, which might involve multiple printers or mints. Ultimately, these fragmented arrangements will be replaced with a single contract, a process that might not run smoothly and which could upset vested interests.

A power shift will be involved as new negotiating teams representing multiple countries acting under regional oversight come to the table. Individual small-country negotiators potentially subject to undue suasion by printers and mints (as suggested by recent press reports that the Austrian national printing press had bribed national authorities to get contracts) will have diminished roles. Importantly, negotiations must be undertaken with regional, multicountry oversight and audit to assure each of the participating countries. On the other side of the table, the currency producers will be negotiating for bigger contracts to replace sometimes very small country production runs. These more lucrative prizes might attract greater attention by official national producers

Efficiencies of scale

The shift to contracts representing many countries could result in important efficiencies of scale. The costs to market and design perhaps two-dozen currencies will be eliminated, and production runs will be larger – potentially much larger.

Congestion

Finally, complicating the picture is that four unions might approach printing presses and mints simultaneously. If capacity is limited, which is possible for large new currency runs, currency production could be a definitive impediment to launching a union.

Conversely, future unions might be able to collaborate on some aspects (such as investigation and selection of security features) to make the design process more efficient and potentially minimize bottlenecks.

Own capacity

As printing and minting runs become larger in new unions, it becomes more feasible for new unions to develop their own capacity. Logically, widely used lower value banknotes and coins with less sophisticated security features should be produced first, with an intention to increasingly produce higher value notes and coins as expertise is gained.

Appendix 2 – E-money and the changeover to union currencies

When new unions start up, it can be assumed that e-money systems will already exist within each union and thus physical cash and e-money policies for the union must be jointly set. Different variants of e-money systems could have different implications for demand for physical currency and for changeover strategies.

- Union planners will need to know the types of systems that will exist within the union prior to settling on cash policies. A policy of simultaneous introduction of e-money and new union physical currency might prove unsatisfactory because the total public demand for the e-money and the channels for its use will be unknown.
- The regulatory scheme for e-money could matter. Will privately-operated systems continue and be allowed market flexibility, or will they be tightly controlled and perhaps even run by the union? Less regulated systems might better respond to technical or market innovations, but more control could allow better integration of e-money and cash strategies.

E-money systems can directly contribute to the cash changeover

- E-money systems can instantaneously convert between national currency and union currency values. National currency values entered into the system can automatically be displayed in the union currency (or also in other national currencies).
- Record keeping accompanying e-money systems can be readily redenominated into the new currency.
- The existing e-money systems can provide information about the cash changeover throughout the country using mobile phone facilities.
- E-money systems can internally operate as the union currency during any virtual currency phase for the new union currency.

E-money agents spread across the country can become channels to receive old national currencies and distribute the new union currency. For example, in the M-pesa system, the system of retail agents spread throughout the country can serve to collect old currencies and distribute the new union currency.

Finally, developers of currency policies in future unions must be aware that they must create a currency that is useful and which will be readily accepted by the public and businesses. Packaging the new union currency within a useful e-money system could be important in achieving a widespread “buy-in” by the public and businesses.