

# CIRCULATION AND SUPPLY OF EURO BANKNOTES AND PREPARATIONS FOR THE SECOND SERIES OF BANKNOTES

## ARTICLES

Circulation and supply of euro banknotes and preparations for the second series of banknotes

*It is the Eurosystem's task to ensure a smooth and efficient supply of euro banknotes and to maintain their integrity. In order to fulfil its task with regard to the supply of euro banknotes, the Eurosystem focused on the further development of its internal policy framework for the production, distribution and processing of euro banknotes in the first few years after the 2002 cash changeover. More recently, attention has shifted to the organisation of the cash cycle in the euro area with a view to, where appropriate, harmonising the cash services provided by NCBs and improving the efficiency of the cash cycle. The implementation of the framework for banknote recycling and the roadmap for a greater convergence of the cash services provided by NCBs are important means to achieve this objective. At the same time, the Eurosystem is providing support for the cash changeovers in Cyprus and Malta, the two countries that will adopt the euro as their currency on 1 January 2008.*

*With regard to its other main task, namely protecting the integrity of the euro, the Eurosystem has been working on research relating to improved and new security features since the 2002 cash changeover. Although counterfeiting statistics do not currently give rise to major concerns, the Eurosystem needs to anticipate new technological developments in counterfeiting in order to stay ahead of the counterfeiters. Therefore, the Eurosystem initiated a project in 2005 for the launch of a new series of euro banknotes with improved and new security features in a few years time.*

## 1 DEVELOPMENT OF CIRCULATION

At the end of August 2007, the number of euro banknotes in circulation came to 11.2 billion, with a total value of €637 billion. The annual growth rates of the value in circulation, albeit declining in the past few years, remained strong. The annual growth rate of the €500 banknote has shown the strongest decline, and came down to 9.4% at the end of August 2007, which was by that date broadly similar to the annual growth rates of the €100 and €50 banknotes. The annual growth rates of the low-denomination banknotes, by contrast, have been fluctuating between 3% and 6% over the past few years.

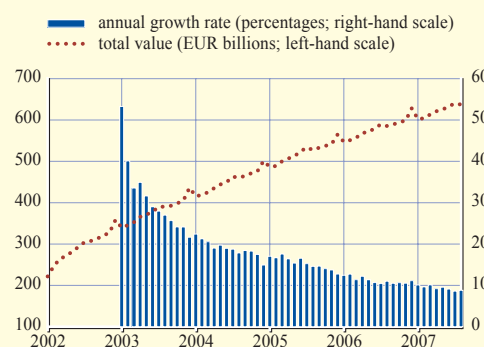
The development of overall circulation can be partly explained by the fact that high-denomination banknotes were non-existent in several countries of the euro area before the cash changeover, so that the use and holdings of these denominations have not yet completely reached a new equilibrium. However, it seems as though this process of “re-optimisation” in currency demand is slowly coming to an end.

The charts below provide more detailed information by illustrating developments since the launch of the euro in terms of both value (see Chart 1) and pieces (see Chart 2).

## 2 FRAMEWORK FOR RECYCLING BANKNOTES

The ECB framework for the detection of counterfeits and the sorting of banknotes for fitness by credit institutions and other professional cash handlers, which was adopted by the Governing Council in December 2004, represents the Eurosystem's new, common policy for the recirculation of euro banknotes within the cash cycle. This framework – which is also referred to as the Banknote Recycling Framework (BRF) – had to be implemented at the national level by the NCBs by the end of 2006; for Banka Slovenije, the deadline is the end of 2007. Thus far, this target has been achieved by 11 NCBs, and implementation has reached an advanced stage in the two remaining euro area Member States. Depending on the competencies of the NCBs, the framework has been implemented by governmental decree, obligatory central bank instructions or contractual arrangements between the NCBs and the individual credit institutions. In view of the increased activities of non-banks in banknote distribution to the general public via automated teller machines (ATMs), the ECB pays particular attention to ensuring that such institutions, too, comply with the standards set out in the BRF in order to treat all cash handlers equally.

**Chart 1 Total value of euro banknotes in circulation in the period from January 2002 to August 2007**

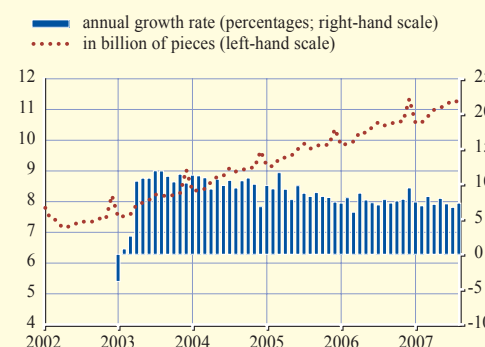


Source: ECB.

The new regulations oblige credit institutions and other professional cash handlers to only supply euro banknotes to their customers that have either been withdrawn at an NCB or that have been checked for authenticity and quality (fitness for circulation) in accordance with the common standards of the BRF. If banknotes are recycled to the general public via ATMs, the mandatory checks must be performed by means of a banknote handling machine that has been approved by the ECB for recycling purposes after the manufacturer had proven to an NCB that the machine authenticates and sorts banknotes reliably. Individual machines are approved for recycling use, in principle, for a period of one year. This is made clear through the publication of the tested models on the ECB's internet website for one year. In a scenario where banknotes are recycled by bank tellers, the required checks of authenticity and fitness must be carried out by trained staff members unless the banknotes were processed on an NCB-tested machine beforehand.

The tests of banknote handling machines, which are coordinated by the ECB, are conducted in a decentralised manner by the NCBs on the basis of a common procedure. Since the adoption of the common testing procedure by the Governing Council in December 2005, a wide range of machines produced by manufacturers throughout the world have passed the tests and new machine

**Chart 2 Total number of euro banknotes in circulation in the period from January 2002 to August 2007**



Source: ECB.

types are being developed. The ECB has taken various measures to further unify the conditions of testing and regularly updates the underlying "test deck", i.e. the set of genuine and counterfeit banknotes, with new counterfeits found in circulation.

### 3 ROADMAP

The single euro cash area has been reality for some years now, but there are still some difficulties for large-scale cross-border cash operations. Therefore, the Governing Council of the ECB has underlined the importance of a fair competitive environment for cash operations on several occasions and, accordingly, the Eurosystem has implemented a number of measures relating to its cash services. In February 2007, the ECB adopted a roadmap for procedural steps contributing, in the medium term, to an increased convergence of the cash services offered by NCBs. Greater convergence is important, first, because it would allow different stakeholders – in particular those with major cross-border cash activities – to fully reap the benefits of the common currency and, second, because it would result in fair competitive treatment.

At the same time, it was underlined that the Eurosystem did not envisage developing a "one-size-fits-all" cash supply system. The

different national economic and geographical environments need to be taken into account and the process of convergence will require some flexibility regarding customer requirements, the cash infrastructure and transitional periods for implementation.

As a first step along the road towards putting this roadmap into practice, remote access to NCBs' cash services is being implemented as from 1 July 2007. This means that credit institutions located in the euro area will have access to the cash services provided by an NCB in another participating Member State, provided that these foreign credit institutions meet the same conditions for withdrawals and lodgements as the national credit institutions. Other issues that are part of the roadmap and under consideration are the development of common packaging standards for the free-of-charge lodgement and withdrawal of banknotes from NCBs, and a common Eurosystem approach to electronic data communications with professional clients. The impact of, in particular, possible common packaging standards on the operations of different parties in the cash cycle will be high since, in order to achieve a certain level of harmonisation, investments need to be made by NCBs and commercial parties in all countries that currently use different solutions. Furthermore, the need for a further harmonisation of the NCBs' opening hours is being investigated, taking into account the differences in the cash infrastructures in the Member States. The Eurosystem is also considering the introduction of orientation-independent banknote lodgements and withdrawals as a common, free-of-charge service, given that technological developments for both banknote processing machines and cash dispensers (ATMs) today allow banknotes to be read and processed in all four orientations. All the aforementioned measures are meant to improve efficiency and to develop the single euro cash area further. In this context, it is worth noting that, currently, the main inhibitor of large-scale cross-border cash operations in the euro area are the different national rules governing cash transports and, especially, the rules regarding the use of firearms. However,

these are outside the ECB's area of competence. Nevertheless, the ECB supports the initiatives for further harmonisation in this area at the European level.

#### 4 THE CASH CHANGEOVER IN SLOVENIA AND FUTURE CASH CHANGEOVERS

On 1 January 2007, the euro was successfully introduced in Slovenia. After a two-week period of dual circulation, during which payments were possible in both tolar and euro, the euro became the sole legal tender on 15 January 2007. The changeover was organised as a "big bang", i.e. without a transitional period, unlike the 12 "first-wave" countries, which had introduced the euro banknotes and coins on 1 January 2002.

On 10 July 2007, the Council of the European Union decided to allow Cyprus and Malta to adopt the euro as their currency as from 1 January 2008. The Guideline on certain cash changeover matters adopted by the Governing Council of the ECB on 14 July 2006 will be the basis on which the Eurosystem will provide support for the changeover preparations in Cyprus and Malta.

Both countries will introduce the euro banknotes and coins on the basis of a "big-bang" scenario with a dual circulation period of one month. The Eurosystem will provide a total of some 170 million euro banknotes to cover the launch requirements needed for the changeover and for 2008 on the basis of a borrowing arrangement. The deliveries will take place in autumn 2007, ensuring a timely start of the "frontloading" and "sub-frontloading" operations.<sup>1</sup>

1 "Frontloading" refers to the supply of euro banknotes and coins by the NCB to credit institutions before the introduction of the euro. "Sub-frontloading" means the distribution by credit institutions of frontloaded euro banknotes and coins to retailers and other businesses.

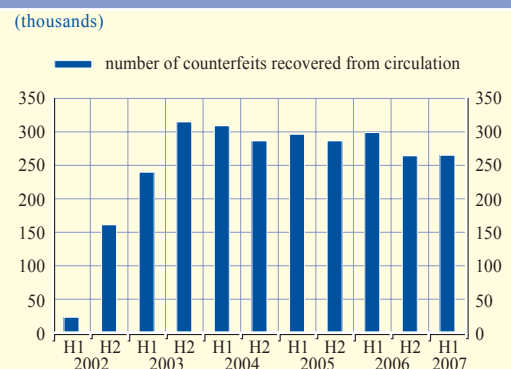
In Cyprus, the frontloading of euro banknotes will start on 19 November 2007. The frontloading of euro coins, which – following a tender procedure – were minted by the Mint of Finland, will begin on 22 October 2007. As of these dates, the sub-frontloading of euro cash will also start. Some 40,000 pre-packed coin starter kits containing a suitable mix of denominations for cash transactions in the first days after €-day, worth €172 each, will be available to businesses and retailers as from 3 December 2007. Moreover, 250,000 mini-kits, worth €17.09 each, will be available to the general public as from the same date.

In Malta, the frontloading of euro banknotes will start in late October/early November 2007. The frontloading of euro coins, which – again following a tender procedure – were produced by Monnaie de Paris, started in late September 2007. Sub-frontloading operations to businesses will begin on 1 December 2007, together with the distribution of coin starter-kits with a value of €131 each to small businesses, notably retailers. The general public will be able to buy mini-kits worth €11.65 as from 10 December 2007.

In Cyprus and Malta, legacy banknotes and coins will be redeemed by the central bank for ten and two years respectively.

Article 52 of the Statute of the European System of Central Banks and of the European Central Bank requires the Governing Council of the ECB to take the necessary measures to ensure that banknotes denominated in currencies with irrevocably fixed exchange rates to the euro are exchanged by the NCBs at their respective par values. Against this background, the Governing Council of the ECB adopted a Guideline on the exchange of these banknotes on 24 July 2006. In connection with the introduction of the euro in Cyprus and Malta, the NCBs of the Member States that have adopted the euro will thus exchange banknotes denominated in Cyprus pounds and Maltese liri against euro at par value from 1 January until 28 February 2008. This service will be free of charge. The

**Chart 3 Number of counterfeits recovered from circulation**



Source: ECB.

maximum amount is limited to €1,000 for any given party/transaction on any one day. A list of NCB locations at which the banknotes can be exchanged, and their respective opening hours, can be found on the ECB's website.

## 5 COUNTERFEITING AND TECHNICAL TRENDS

For the last four years, the total number of counterfeits withdrawn from circulation has broadly been stable, averaging out at a little under 50,000 pieces per month. Chart 3 shows that more recently, the average has declined towards the level of 40,000 pieces per month.

The effectiveness of a counterfeit deterrence system that prevents personal computers and digital imaging tools from capturing and reproducing the image of a protected banknote has had a significant impact on the counterfeiting techniques applied over time. The Central Bank Counterfeit Deterrence Group (CBCDGD), in which the ECB participates, along with many other central banks around the world, aims to promote the voluntary adoption by hardware and software producers of a counterfeit deterrence system to prevent the use of PCs, digital imaging equipment and software in the counterfeiting of banknotes. In the early days of the euro banknotes, a significant proportion of the counterfeits was produced with the aid of

inkjet and laser printers, as well as colour copiers. However, the effectiveness of CBCDG developments has caused the volume of counterfeits produced by PC-related techniques to decline considerably, while that of counterfeits produced on the basis of traditional printing techniques has increased. Nowadays, approximately half the counterfeits detected and withdrawn from circulation were those produced with fewer than ten distinctly identifiable sources of traditional printing technology.

## 6 PLANNING OF THE SECOND EURO BANKNOTE SERIES

The counterfeiting situation does not currently give any cause to change the existing series of euro banknotes. However, in order to be prepared for new developments in counterfeiting and to stay technologically ahead of the counterfeiters, the ECB, like other central banks, must continuously improve the resilience of the banknotes against counterfeiting. For that reason, the Governing Council approved the master plan for the development and introduction of the second series of euro

banknotes (ES2) in April 2005. That provided a starting point for further planning and development. The master plan stipulates that the ES2 design is to be based on the “ages and styles” theme of the current series, ensuring that the new banknotes will be immediately recognisable as euro banknotes. The master plan also provides for the ES2 banknotes to be issued gradually, with intervals between the issuance of different denominations, at least the first of which will be introduced one at a time. In the course of 2005, the ECB ascertained the functional and technical requirements of different groups of banknote users through consultations and public research. In this phase of the project’s initiation, a short-list of visual and machine-readable security features was established, from among which the final security features will be selected. Throughout the development of the ES2 banknotes, the ECB will remain in contact with all relevant stakeholders (see Box 1).

In order to be able to select the appropriate security features, an extensive programme has been run to test the viability of both an industrial production of the various features and the large-scale production of banknotes with the short-

### Box 1

#### STAKEHOLDERS IN THE DEVELOPMENT OF THE SECOND SERIES OF EURO BANKNOTES

The main challenge in developing a new series of banknotes is ensuring that, on the one hand, the new banknotes are innovative and difficult to counterfeit, and that, on the other, they are easy to check and have security features that can be easily communicated. At the same time, the euro banknotes should be made sufficiently resistant to wear and tear. Another aspect of particular relevance for the development of the euro banknotes is the need to ensure that all printing works (currently 15 printing works are accredited for printing euro banknotes) are able to deliver the same consistently high quality. In addition, the Eurosystem should take account of the needs of the different stakeholders. Public surveys and meetings with European associations, such as the European Payments Council, the European Security Transport Association, EuroCommerce, the European consumer associations and the European Blind Union, provide the ECB with feedback on what is needed. Other stakeholders are the vending machine industry and operators of commercial cash centres that process euro banknotes in large quantities. These stakeholders have become ever more important over the years, especially with the implementation of the framework for banknote recycling, and are becoming key players in

the cash cycle. The ECB is therefore also in close contact with the manufacturers of such machines and/or banknote sensors. As in the case of the introduction of the first series of euro banknotes, these manufacturers will be invited by the ECB to adjust and test their equipment once test notes with the final specifications are available.

listed features. At the same time, information on various aspects of the security features has been collected, such as their resilience to counterfeiting, quality control requirements, costs, intellectual property rights, supply chain situations, as well as health, safety and environmental issues. This process of industrial validation, in which all aspects of the potential security features were tested, has almost been completed.

Once the security features have been selected, the development programme will enter into the next phase, determining the design of the new series of euro banknotes. The challenge to be dealt with by the designer is to integrate the selected security features into an aesthetically attractive design that makes the banknote, as such, secure and user-friendly. A user-friendly banknote has a design with easy to recognise security features which can be communicated to the public in a clear and simple way. In order to have guidance for the design of the banknotes and to learn how the communication on the euro banknotes can be improved the ECB carried out several studies (see Box 2). Taking this into consideration, the designer has also to preserve as much as possible of the design elements of the current series, so that the banknotes of the new series can be clearly

recognised as euro banknotes. Therefore, elements such as the windows, gateways, bridges, the European flag and the map of Europe will be retained in the new series of euro banknotes. The map on the reverse side of the banknotes will be amended to depict the enlarged European Union. The establishment of the design will be followed by the “origination”<sup>2</sup> work required for producing the ES2 banknotes, and the elaboration of the accompanying draft technical specifications.

The last step before large-scale printing will be a pilot production run carried out at a few printing works, in which all process-related aspects will be extensively analysed. The large-scale production will require extensive preparations in terms of potential investments in printing machinery and the implementation of any new quality management requirements and production monitoring systems.

After the launch of the ES2 banknotes, the circulation of banknotes of the old series will gradually decrease. At some point in time, their

2 “Origination” covers the process of high-quality image preparation and the transformation of designs into production tools, such as printing plates and production forms for the different manufacturing steps.

## Box 2

### COMMUNICATION ASPECTS RELATED TO THE INTRODUCTION OF THE SECOND SERIES OF EURO BANKNOTES

Qualitative surveys carried out by the ECB suggest that cash users do not usually pay much attention to the security features of the euro banknotes and are familiar with only a limited number of these features. Only a tiny fraction of the respondents was able to name or describe their functionalities. Knowledge is, in most cases, limited to the traditional security features – to the tactile properties, the watermark and the security thread. The research results show that



people trust that central banks issue safe banknotes and, probably as a consequence thereof, hardly check them. Furthermore, the public seems to experience some difficulties in locating the security features on the banknotes. Therefore, communicating on the security features of the banknotes is an important and ongoing challenge. It can be aided by a user-friendly banknote design. Against this background, the ECB has been testing potential new security features and artistic designs for the ES2 banknotes through qualitative research into public perceptions. Its outcome will be taken into consideration during the development of the ES2 banknotes so as to pave the way for the euro banknotes to be well accepted by the public.

With respect to communications on the current series of banknotes, such qualitative research has helped to make communication tools, such as brochures, leaflets and electronic communication media more easily comprehensible by avoiding technical terms for the security features and by providing simple instructions on how to authenticate a banknote.

circulation will have reached a level at which these banknotes will hardly be used in daily cash transactions. In line with the policies of most central banks with regard to their currencies, the ECB will inform the public well in advance as to when the euro banknotes of the old series will lose their legal tender status, i.e. when the first series of euro banknotes would no longer be accepted as a means of payment. However, euro banknotes of the old series will be redeemed by the NCBs for an unlimited period of time.

endeavours are aimed at obtaining efficient and effective national solutions that acknowledge technical advances, rather than at having identical cash cycles in all euro area Member States. Furthermore, work is in progress to develop a new series of euro banknotes that contain improved and new security features, while the design will remain close to that of the current series. Given the considerable lead-time necessary for such developments, the first denomination of the new series is expected to be issued in a few years time.

## 7 CONCLUSION

The continuous growth of euro banknote circulation indicates that, despite the development of other means of payment, euro cash remains an important payment instrument. This article shows that the Eurosystem is working on measures that should improve the efficiency of the cash cycle and, where appropriate, further integrate the national cash systems in the euro area. On account of the great differences in the national cash cycles and the many different parties involved, this is a long and complex process that requires time, significant effort and considerable investment. One of the main objectives is to increase the convergence both of the services offered by the NCBs and of the quality of the banknotes in circulation. At the same time, the Eurosystem's