The roles of De Nederlandsche Bank in euro banknote circulation
Introduction

On 1 January 2002, the Netherlands adopted the euro as legal currency, along with eleven other countries of the European Union. Today the euro is the currency of fifteen countries collectively referred to as the euro area. This means that presently around 320 million European citizens use the euro for their daily payments. Given this number, it will not come as a surprise that more than 11 billion euro banknotes are in circulation and the demand for euro notes is rising. The number of euro banknotes circulating in the Netherlands, which due to the cross-border migration effect cannot be told precisely, is roughly estimated to vary between 300 and 400 million notes.

De Nederlandsche Bank (DNB) is part of the European System of Central Banks and the Eurosystem. One of DNB’s responsibilities is to ensure safe and reliable cash and non-cash payments. This brochure provides information on DNB’s roles in banknote circulation, i.e. that of Operator, Initiator and Communicator.

Please enjoy reading about the way DNB has been fulfilling these roles in a dynamic cash environment.

Facts and figures

The Netherlands:

- Total area: 41,500 km²
- Land below sea level: 26%
- Population: 16.4 million
- Capital city: Amsterdam
- Seat of government: The Hague (Den Haag)

- Currency: Euro (EUR)
- Exchange rate (2008-01-01): EUR 1 = USD 1.47
- GDP per capita: EUR 33,000
- Number of credit institutions: 345
- Number of cash centres: 13
- ATMs: 0.5 per 1,000 inhabitants

DNB employs the full-time equivalent of 1,586 staff, of whom:
- Payments: 290
- Supervision: 449
- Monetary policy: 209
- Statistics: 79
- Internal services: 559

Artis Amsterdam zoo

Founded in 1838 by a bookseller and a watchmaker, Artis started as a public garden with a pond, an orangery, deer, monkeys, parrots and a panther purchased for 400 guilders.
ROLE AS OPERATOR

Changing role in banknote distribution

The Eurosystem is responsible for the issuance and circulation of euro banknotes. The role of DNB in banknote circulation has changed in recent years. As a result, the responsibility of commercial banks in this area has increased, and the number of banknotes returned to DNB has declined.

Banknotes are distributed through DNB’s head office, located in Amsterdam. The commercial banks obtain the required banknotes from DNB. Most notes reach the public via cash dispensers (ATMs), of which there are some eight thousand in the Netherlands. The public spends the notes again in shops and elsewhere.

Retailers deposit the notes they receive at their banks or use it as change. The banks check the banknotes for counterfeits and inspect the quality of the notes, in accordance with the ECB Banknote Recycling Framework. This process is monitored by DNB. The unfit notes and a share of the fit notes are shipped to DNB for further processing, while the other fit notes are directly put back into circulation again. To keep a grip on the quality of banknotes, DNB processes 600 to 800 million notes a year (against 1.8 billion notes in 2004).

While DNB is entrusted with banknote issuance, the Ministry of Finance is responsible for minting and issuing coins. DNB advises on the number of coins to be minted annually. By virtue of a Royal Decree, DNB holds the operational responsibility for the distribution of coins.
Sorting machines

Since 1972, DNB has been operationally involved in the automated processing of circulated banknotes. While before that, banknotes used to be sorted on the basis of visual inspection and human judgement by carefully trained experts, from the said year purpose-built sensors took over this task. As no experience was available with authenticity sensors, DNB explored the idea that, under normal conditions, no serial number could appear twice. This led to the decision to read the numbers of all banknotes returned from circulation and store them in a database. Over the years many other advantages from reading banknote serial numbers were recognised, such as the ability to follow ransom notes, internal process control and audit, the possibility to conduct circulation trials in order to monitor the quality of circulated banknotes and the evaluation of banknote production improvements designed to extend the life span of banknotes.

Having started with the Crosfield sorter back in 1972, today already our third generation of sorting systems is in operation. The eight DeLaRue CPS systems currently installed are standard, but customised, sorting machines, again equipped with serial number reading systems. The machine output (1.2 billion notes a year) is now fully automated: unfit banknotes are shredded online and fit banknotes are strapped to packages. The packages are combined to bundles which are finally stored in cash boxes with transparent lids. The sorting systems interface with the new IT system CashSSP.

Anne Frank

Born in Frankfurt, Anne Frank moved to Amsterdam in 1933 to escape Nazi persecution. She went into hiding in 1942, was betrayed in 1944 and died in Bergen-Belsen in 1945.
Cash IT System

To support its banknote handling processes, in 2007 DNB introduced a new IT system developed by the National Bank of Belgium, i.e. the Cash Single Shared Platform (CashSSP). As its name suggests, CashSSP enables joint use of the cash IT system. It controls and monitors the entire logistic process, from the announcement of a lodgement by commercial operators up to the processing of orders for (re-)issuing fit and new euro banknotes. CashSSP now operates in four countries: the Netherlands, Belgium, Luxembourg and Finland. An advantage of this cooperation is that the credit institutions and the cash handlers in the said countries can settle their cash transactions in one and the same way. Furthermore, the central banks cooperating in this partnership enjoy cost savings as the expense of the system’s operation and its continued development is borne collectively. The CashSSP partnership is open to new partners. Other central banks are also interested in taking part. Increased participation will lead to further cost reductions and increasing benefits for the financial sector.
State of the art banknote logistics

For many years DNB used mobile transport units – steel containers on wheels – for in-house cash-in-bulk transportation. These containers contained twenty trays, each holding 10,000 banknotes of one denomination. The open trays facilitated ease of handling to and from banknote processing, while the sealable containers were made for an efficient transfer of large sums between branches and vaults. With the rise of large-scale commercial cash centres, these transport units were also increasingly used for cash transfers between these cash centres and the central bank. All tracking and tracing of materials was based on bar-coding.

Changing requirements have recently led to the development of a new generation of handling materials. Although still based on mobile transport units and trays, tremendous improvements have been achieved. Each tray (cash box) of 10,000 banknotes is now separately closed and sealed. This enables processing of different cash boxes from the same deposit by different operators and different machines at unrelated moments in time, while keeping all transactions fully traceable by the IT system CashSSP. Ergonomics have also improved significantly: the average weight of a loaded transport unit was reduced from 475 kg to only 250 kg.

Rembrandt
In this house, on St Antoniebreestraat at the edge of the Jewish quarter, Rembrandt painted his famous Nightwatch. He lived here from 1639 until 1658, when his bankruptcy forced him to move.
ROLE AS INITIATOR

Design of cash

Dutch public design was very popular in the period 1970 – 1995. Not only coins and banknote design rose to great heights, also stamps, public telephones, public letter boxes, public transport and road signs were famous exponents of Dutch Design.

For the development of the euro banknotes in 1996 three Dutch designers made a contribution. Key: all designs exude happiness. The responsibility for the national side of the euro coin designs lies with the Minister of Finance.

Today, DNB actively participates in the design process for the next generation of euro notes. Public feedback is input for the design process, just as communication advice from a professional agency. It was found that the themes on the euro notes are not known, like Iron and Glass on the euro 200. For the Dutch more appealing European themes, like the Eiffel tower, are preferred for this period.

The NLG 50/Sunflower.  
Design for EUR 10
One of the most appreciated  
Dutch banknotes  
Soil will hardly be visible on this note (1997, Jaap Drupsteen).

Monopoly money is optimised for quick value recognition during the game.

Design for EUR 5, optimised for value recognition and security features, leaving out the main image/motive (1996, Jaap Drupsteen).

Monopoly money is optimised for quick value recognition during the game. DNB regards reference to monopoly money as a compliment. Of course, real banknotes should also be secure.

 Coin designs featuring Queen Beatrix on the national side of the euro:
- 1996, Bruno Ninaber van Eyben
- 1996, Gerald van der Kaap
- 1996, Roelof Mulder

Bicycle

The most important means of transport in Amsterdam. More than three-quarters of the citizens of Amsterdam own a bike and half of them ride it daily. Amsterdam numbers a total of 550,000 bicycles.
DNB Knowledge Bank

In 2002 DNB introduced the motto “DNB Knowledge Bank”. Payment systems, one of them being cash, are pointed out by DNB’s board as one of the three main knowledge areas of DNB, together with supervision and monetary policy.

In recent years DNB has published on subjects like:
- the costs of payments;
- public feedback on banknote design;
- counterfeit detection by the public.

Cost of Cash

As you may know, the Dutch have a reputation for being stingy. Maybe we are, and maybe because of this all employees of DNB are imbued with DNB’s main mission to make things – also outside DNB – more efficient, in favour of the general public, the government and the private enterprises. Therefore we carried out a cost survey for the Netherlands to quantify the social costs of generally used payment instruments, cash, debit cards, the e-purse and the credit card. It proved - see our study ‘Payments are no free lunch’ - that the overall costs involved in Point of Sales payments amount to 0.65% of the GDP. An average cash transaction is the cheapest one if the total costs – fixed and variable costs – are taken into account, followed by such a transaction with a debit card. See the graph, in which the average transaction amounts per payment instrument (between brackets) are mentioned. If only variable costs are taken into account, the e-purse is most economical for any transaction amount. If one has to choose between cash and the debit card, cash is more economical for purchases below the EUR 11.63, while the debit card is to be preferred for larger transactions. The credit card is less attractive than the debit card, irrespective of the transaction amount.
Public opinion poll

Information from customers is essential for good product design. A simple and effective method is used to obtain market information. Once every two years the public’s knowledge and appreciation of the latest notes are measured. This is an objective way of ensuring feedback as to the quality of the latest banknote designs. The most important results are that:
- the appreciation of banknote (beautiful or ugly) and the knowledge of picture and text elements are correlated;
- in 2007, the average number of security features known to a Dutchman is 1.9;
- nobody can name more than four security features.

Testing of authentication devices

Early 2004, Dutch trade associations indicated that the great diversity in banknote authentication equipment was confusing to retailers. They would require impartial information on the reliability of this equipment to help them decide which equipment to purchase. Since such information was not available, DNB took the initiative to test the performance of authentication equipment and publish the results on its website.

A distinction was made between two basic types of equipment. Auto-detection devices, which automatically indicate authenticity by a visible or audible signal, could basically be tested by feeding them counterfeit and genuine banknotes and scoring the results. For verification aids like ultraviolet lamps, which still require the user to decide on a banknote’s authenticity, things were more complex. To investigate the effectiveness of verification aids 160 retail cashiers and 40 individuals from the general public were tested for their ability to authenticate banknotes with and without the use of these aids. This resulted in the DNB Working Paper: ‘Counterfeit or Genuine: Can you tell the difference?’ You are invited to download it from our website.
Publications


Brits, Hans and Winder, Carlo. ‘Payments are no free lunch’ De Nederlandsche Bank NV, Occasional Studies, Volume 3, Number 2, October 2005


Jonker, Nicole, Scholten, Bram and Wind, Marco. ‘Counterfeit or genuine: can you tell the difference?’ DNB Working Paper No. 121, De Nederlandsche Bank NV, Amsterdam, December 2006


De Heij, Hans. ‘Public feedback for better banknote design 2’, Occasional Studies, Volume 5, Number 2, De Nederlandsche Bank, November 2007

You may find these and other publications on www.dnb.nl, Research > Research Publications > DNB Payments.

Tendering for the production of banknotes

The ECB and the central banks of the euro area countries annually determine the required production of new euro banknotes. Each central bank is responsible for part of the production of one to three denominations.

DNB has placed traditionally its orders for the delivery of banknotes with the printing works of the Royal Johan Enschedé Group, established in 1703 and one of the oldest family owned companies in the Netherlands. With the introduction of the euro the market became more transparent. This made it possible for DNB, as the first central bank of the euro area, to conduct a European tender for its 2009 quotas. The central banks of Cyprus, Luxembourg, Malta and Slovenia decided to join the DNB tender. It turns out that by this, caused by the higher number of banknotes, considerable lower prices are going to be paid by all central banks involved. By joining forces in this respect also other efficiency advantages – for instance with regard to the approvals and the transportations – are reached. A peculiarity of this tender is that, in line with the social engagement of DNB and its partners, suppliers are required to use banknote paper consisting of at least 15% ‘Fair Trade’ cotton.
**Fair Trade**

In 2007, the first euro banknotes using Fair Trade cotton were issued by DNB. This cotton, bearing the Max Havelaar stamp of approval, is bought at a fair price. The cotton is produced with consideration for social and environmental aspects and is audited for compliance with this requirement by an independent labelling organisation. Fair Trade cotton accounts for 20% of the latest DNB print run of EUR 10 banknotes in 2007.

The Fair Trade EUR 10 note is the result of a cooperation between DNB, the Solidaridad Foundation and the Max Havelaar Foundation. This cooperation is aimed at increasing the supply of Fair Trade cotton. In 2008, also the EUR 20 and 50 note will contain some Fair Trade cotton. The possibilities of expanding the project to an international level will be examined in more detail in the future.

**Westertoren & Zuidertoren**

Amsterdam has many towers, among them Westertoren and Zuidertoren. The Westertoren (finished in 1638) is Amsterdam’s highest tower at 85 meters.
Life span of banknotes

DNB has shown interest in an efficient use of banknotes since 1953. In that year we started issuing coated banknotes in order to protect the notes against soiling. From then on, all the guilders notes would be coated with a special varnish. During this period efforts were made to improve the quality of the coating with the help of circulation trials. The last circulation trial, held in 1998, showed that coated notes lasted twice as long as uncoated ones. DNB is now actively participating in an ECB project to extend the life span of the until now uncoated euro banknotes.

Another option to extend the life span of banknotes is to improve the quality of the sorting process. At present, a significant portion of the notes destroyed is still fit for circulation. On the other hand, we can see visually unfit notes that are considered fit by the sorting machine and returned to circulation. With the help of our sorting system’s number readers, DNB has been able to identify relevant parameters for increasing the life span of banknotes and for improving the soil sensors currently used in sorting machines. A major task is now to implement these parameters and realize another extension of the life span of banknotes.
ROLE AS COMMUNICATOR

Communication to the public

If we are to rely on the cash in our purses, banknotes must be well-protected against counterfeiting and checked regularly. Within the Eurosystem, DNB is engaged in developing secure banknotes. Therefore, banknotes are produced by using sophisticated technology and appealing designs. But communication, too, is a key element in safeguarding the euro. DNB considers it important for the public (retailers and consumers) to be vigilant and to have ready knowledge of the euro banknotes, including the ability to distinguish between counterfeit and authentic notes. Since the euro’s introduction in 2002, DNB has actively conducted information campaigns, through media like press releases, annual reports, quarterly bulletins, brochures and posters. Further, DNB holds regular consultations with banks and other parties involved in cash circulation.

Besides the communication about the euro, the euro itself also communicates. Developed by Robert Kalina, the banknotes feature images that symbolise communication between people, e.g. ‘gate/window’ = openness to others, and ‘bridges’ = linking people.

Communication symbols

Today, communication is increasingly being based on communication symbols, for example symbols of petrol stations and campsites on a road-map. DNB figured out that symbols may also be helpful to communicate the security features on banknotes. The public would know where to look and how to check a security feature by feeling the banknote, looking at it and tilting it.

The following symbols have been developed to be used in communication tools:

Feel:
Rub, scratch, feel the note with the finger or nail.
Ink relief (intaglio), type of paper/substrate, …

Look:
Hold the note to the light.
Watermark, security thread, see-through number, …

Tilt:
Move, turn the note.
Hologram, colour-shifting ink, iridescent stripe, …

Design: Bureau Mijksenaar BV, Amsterdam (2001)

Magere Brug & Carré
Built in 1670, the Magere Brug, connects the 17th century ring of canals with the post-1700 urban extension. From the Magere Brug one has a splendid view of the Carré theatre (1887).
Security features

The security features of the banknotes are designed for different users. Consumers and cashiers need to know about these features to be able to tell a genuine banknote from a false one.

Typical of the public security features is that they can be checked without sophisticated equipment. Just by feeling a banknote, looking at it and tilting it you can quickly check if a banknote is genuine. Because retailers usually check a note in their workplace, they can use tools and instruments, such as an ultraviolet lamp. Retailers seem to prefer automated detection devices that do not need human interpretation.
Authentication devices on ECB website

As mentioned in the previous section, in 2004 retailers asked DNB for a list of suitable authentication devices for euro banknotes. Soon after DNB started publishing the test results, the Eurosystem central banks adopted this approach. DNB was granted the task of acting as the central data and webpage manager for all data related to equipment testing. Nowadays, all Eurosystem central banks send the relevant data of tests performed by them - on authentication devices as well as Banknote Recycling Framework machines - to DNB. At DNB this data is processed, stored and compiled into overview tables for publication on the ECB website (www.ecb.int, Banknotes & Coins > Testing of banknote authentication devices).

The Dam

The National Monument, commemorating World War II, and the Palace on the Dam. Built between 1648 and 1665 and resting on a foundation made up of 13,659 wooden poles, the Palace was to serve as Amsterdam’s town hall. Since 1808 it has operated as a royal palace.
Test yourself

DNB developed the software program “Genuine or Counterfeit?” that helps you recognise a genuine euro note and spot a counterfeit. With this program you may familiarise yourself with the security features of the euro notes or test what you already know. You may also find this program on www.dnb.nl.

Colophon

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