EUROPEAN PARLIAMENT

TASK FORCE
on Economic and Monetary Union

Briefing 36

Euro Banknotes and Coins:

Technical Features

Briefing prepared by the Directorate-General for Research
Division for Economic Affairs

The opinions expressed are those of the author and do not necessarily reflect the European Parliament's position.

Although the changeover to the Euro is scheduled for 1 January 1999, the euro banknotes and coins will not be introduced until three years later.

PE 167.006

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INTRODUCTION

Article 3a of the Treaty on European Union, commonly known as the Maastricht Treaty, provides for *'the irrevocable fixing of exchange rates leading to the introduction of a single currency, the ecu, and the definition and conduct of a single monetary policy and exchange-rate policy'*.

The European Council meeting in Madrid on 15 and 16 December 1995 decided on a new name for the single currency: the **euro**.

The respective prerogatives of the various institutions with respect to the single currency are defined in the Treaty on European Union (TEU) and its annexes.

The European Central Bank (ECB, established by Article 4a of the TEU), for example, has *'the exclusive right to authorize the issue of banknotes within the Community. The ECB and the national central banks may issue such notes. The banknotes issued by the ECB and the national central banks shall be the only such notes to have the status of legal tender within the Community'* (Article 105a(1) of the TEU).

For their part the *'Member States may issue coins subject to approval by the ECB of the volume of the issue. The Council may, acting in accordance with the procedure referred to in Article 189c and after consulting the ECB, adopt measures to harmonize the denominations and technical specifications of all coins intended for circulation to the extent necessary to permit their smooth circulation within the Community'* (Article 105a(2)).

Article 189c of the TEU defines a decision-making procedure requiring the Council to consult the European Parliament, whose rejection of the Council's common position can be overruled only by unanimity in the Council.

It therefore seems clear that the roles in the production of the euro are to be shared between the European authorities (especially the ECB) and the Member States, banknotes being the ECB's responsibility, coins the Member States' responsibility, though under the ECB's control, with the Commission acting as coordinator.

The timetable for the changeover to the euro and its introduction in fiduciary form were approved by the European Council in Madrid on 15 and 16 December 1995 after the adoption of the *Green Paper on the practical arrangements for the introduction of the single currency* presented by the Commission[1]. The final decision to introduce the euro on 1 January 1999, when Stage Three of EMU begins, was then announced.

[1] COM(95)333 final, 31.5.1995

Timetable for the production and issue of Euro banknotes and coins

❒ *Early 1998*:

The European Council of the Heads of State or Government adopts the list of Member States that will participate in the Euro area (in the first wave), together with the bi-lateral conversion rates of the currencies concerned.

- ➥ The production of Euro banknotes and coins begins.
- ➥ The precise date on which Euro banknotes and coins will be introduced is announced.

❒ *1 January 1999: beginning of Stage Three of EMU*

- ➥ The conversion rates among the currencies of the participating Member States and the euro are irrevocably fixed.
- ➥ The new legislation on the introduction of the Euro enters into force.
- ➥ The use of the Euro is introduced for scriptural settlements.

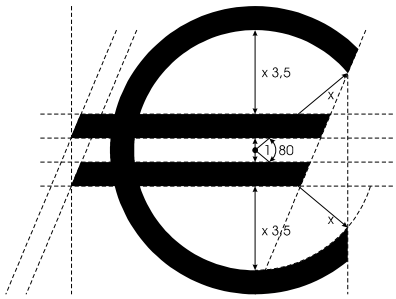
❒ *1 January 2002 at the latest: introduction of Euro banknotes and coins*

- ➥ The banknotes of the countries that have adopted the Euro are exchanged at par value for Euro banknotes.

❒ *1 July at the latest: complete changeover to the Euro*

- ➥ National banknotes and coins cease to be legal tender.
- ➥ National banknotes and coins are withdrawn from circulation.

The symbol



It was also decided to adopt a symbol for the Euro. The Commission recommends that it be used as widely as possible by all economic and financial organisations and that the data processing and information technology industry make the necessary preparations for the symbol to be included on keyboards. The Commission has also made arrangements for the symbol to be registered with the International Standardization Organization. Inspired by the Greek letter epsilon, the symbol has its source in the cradle of European civilization and represents the first letter of the word *Europe* crossed by two horizontal bars indicating the Euro's stability: the double bar is also to be seen in the symbols for the American dollar ($) and the yen (¥) - '*strong international currencies*' - and also the pound sterling (£). It was also decided to use the three-letter code **EUR** to represent the Euro, particularly in the financial markets.

THE EURO BANKNOTES

The future European Central Bank (and the European System of Central Banks) will alone be responsible for the issue of banknotes in the Member States that adopt the euro. The ECB will not be established until after the official announcement of the list of the first countries participating in the Euro area, which will be adopted by the European Council of the Heads of State or Government not later than 1 July 1998[2].

However, pending the official establishment of the European Central Bank, a European Monetary Institute (EMI) has been created. Its tasks include the *'preparation of the third stage'* of EMU, for which it will *'supervise the technical preparation of ECU (euro) banknotes'* (Article 109f(3) of the TEU). To this end, the EMI has set up *'a Working Group on Printing and Issuing a European Banknote which reports to the EMI Council on all issues of preparatory work in the banknote area'*[3].

The process of selecting designs

- On a proposal from a consultative group composed of art historians, graphic design experts and marketing specialists the European Monetary Institute adopted two themes for the designs of the future euro banknotes:

  - a specific theme: *ages and styles of Europe*, recalling Europe's cultural heritage;

  - a theme consisting of a modern or abstract design.

- After the security features that have to be incorporated in any banknote to help combat forgery had been defined, various features were chosen to make it easier for the banknotes to be used by the blind and partially sighted:

  - 7 denominations of different sizes were defined;

  - each banknote will have a different dominant colour:

5 euros	➪	120 mm x 62 mm	➪	grey
10 euros	➪	127 mm x 67 mm	➪	red
20 euros	➪	133 mm x 72 mm	➪	blue
50 euros	➪	140 mm x 77 mm	➪	orange
100 euros	➪	147 mm x 82 mm	➪	green
200 euros	➪	153 mm x 82 mm	➪	yellow
500 euros	➪	160 mm x 82 mm	➪	purple

  - the face values will be printed in large, bold figures in the same place on the front and back of each note;

[2] See Article 109j(4) of the TEU.
[3] EMI press release of 13 December 1996

- each denomination has its own special tactile features (embossed design).

❒ The competition for the selection of designs (from 12 February until 13 September 1996) was open only to qualified graphic designers or design teams (with experience of designing banknotes and a knowledge of the technical aspects involved) previously selected by the national central banks[4], each country being permitted to nominate three candidates.

A jury of independent experts compiled a shortlist from the designs, which were identified only by numbers (neither the name of the team nor the country of origin was known). A representative sample of the European population consisting of some 2000 people was then consulted to assess public reactions.

The EMI Council made the final choice, taking account of the jury's report, the results of the survey and the opinion of the EMI's Banknote Working Party, which is composed of the Chief Cashiers of the European central banks and the General Managers of printing works controlled by the central banks of the EU countries. The winning designs were produced by Mr Robert Kalina of the Oesterreichische Nationalbank. The Dublin European Council (13 December 1996) approved the choice made by the EMI, which presented the designs selected to the public the same day.

Description of the future Euro banknotes

The designs chosen by the EMI are inspired by the theme *ages and styles of Europe*, since they '*blend the historical development of the technical, artistic and communication fields in Europe in one harmonious composition, and epitomise the dawn of the new common Europe with its common cultural heritage, and the vision of a common future in the next century, indeed, the new millennium*'[5].

The design chosen has the following features:

- The seven ages of Europe's cultural history are depicted: *Classical* (5 euro note), *Romanesque* (10 euros), *Gothic* (20 euros), *Renaissance* (50 euros), *Baroque and Rococo* (100 euros), *iron and glass architecture* (200 euros) and *modern 20th century architecture* (500 euros).

- These seven ages are represented by their respective *architectural styles*: the three great architectural elements depicted - *windows, gateways and bridges* - are not intended to show a specific monument or country, but are representative of the architectural styles to be found in much of Europe.

[4] In the fifteen Member States of the European Union with the exception of Denmark
[5] EMI press release, 13 December 1996

- The front of each banknote shows *windows and gateways* - symbolizing '*the spirit of openness and cooperation in the European Union*' - and the twelve stars of the European Union, '*representing the dynamism and harmony of contemporary Europe*'[6].

- The reverse side of each banknote features a bridge that is characteristic of the period of Europe's history recalled by the banknote: '*Bridges are used as a metaphor for communication both among the peoples of Europe, and also between Europe and the rest of the world*'.

The various banknotes also bear the following features:

- the name of the currency in both Latin (EURO) and Greek (ΕΥΡΩ) characters;

- the flag of the European Union, which may be replaced with a distinctive national feature: a decision was to have been taken by the European Council at its meeting in Amsterdam (16 and 17 June 1997), but a common position has yet to be adopted;

- the initials of the European Central Bank (issuing authority) in their five variants: BCE, ECB, EZB, EKT and EKP;

- the signature of the President of the ECB, positioned close to these initials.

The security features of the Euro banknotes

To protect against forgery, various measures have been taken to ensure that the notes will be at least as difficult to counterfeit as those currently issued by the European central banks.

The principal measures are:

- the use of fiduciary paper containing fluorescent fibres and a multitone watermark, which is particularly difficult to imitate;

- modern security features recognizable by the public, incorporated in the paper (security thread), printed (intaglio printing) or deposited on the paper (diffractive or reflective foils);

- the incorporation of machine-readable security features for use by the central banks and the vending and note-handling machine industry.

The EMI explains that '*these security features should enable a person to identify a counterfeit with a minimum of careful attention. The ECB and the national central banks will take great care in making known to the general public the relevant security features of the euro banknotes before and after they are put into circulation*'[7].

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[6] EMI press release, 13 December 1996
[7] *idem*

Production and issue of Euro banknotes in the *Euro area* Member States

After the design selection phase, adjustments have had to be made to refine the designs and make the origination and printing processes possible. This operation, which began in December 1996, should be almost complete. It will have enabled necessary modifications to be made following appeals to the EMI from European citizens and their representatives in the European Parliament[8].

The term *'origination'* covers the technical process that consists in transforming the banknote designs into *specimen plates*, which will then be reproduced to make the plates used to print the banknotes. This will be followed by a trial printing period for the machines before an actual start is made on printing the banknotes in large numbers.

The process comprising the completion of the printing plates and the preparations necessary for the production of the banknotes should be concluded in the first few months of 1998. During 1998 mass production of notes will begin. The actual date of their introduction - not later than 1 January 2002 - should be known before 1 January 1999.

The decision to begin the mass production of the banknotes will not, of course, be taken until after the European Council has adopted the list of *euro area* Member States (the first wave). This should occur at the beginning of May 1998. The same European Council will appoint the Executive Board of the European Central Bank. The European System of Central Banks (ESCB)[9] can then be established. It will be responsible for issuing the new banknotes denominated in Euros. The Council of the European Monetary Institute has decided that *'all printing works of the countries participating in the euro area from the start of Stage Three and currently involved in the production of national banknotes can take part in the production of the initial stock of euro banknotes'*[10].

This indicates that

- on the one hand, the printing works responsible for printing the banknotes of the countries subsequently[11] joining the Euro area cannot participate in the printing of the euro banknotes even if their countries join the Euro area before the banknotes go into circulation (i.e., if all goes to plan, 1 January 2002);

- on the other hand, concentration of the Euro banknote printing centres cannot be ruled out since it will simply be a question of progressively replacing stocks.

Of the fifteen Member States of the European Union, thirteen currently have their own banknote printing works, which either form part of the central bank (Belgium, Denmark, Greece, France, Ireland, Italy, Austria and the United Kingdom) or are public limited liability companies controlled

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[8] See I(5), Some facts to bear in mind ...

[9] The ESCB will be composed of the ECB and the central banks of the Member States participating in the euro area; see *The European System of Central Banks*, (Briefing No 27, Task Force on Economic and Monetary Union, PE 166.627, 20 February 1997).

[10] European Monetary Institute, Annual Report, April 1997, Frankfurt-am-Main

[11] Second wave, after 1 January 1999

by the national central bank (Finland and Sweden) or public limited liability companies not controlled by the central bank (Spain and the Netherlands). Only one country (Germany) has entrusted this task to a public undertaking and a private company.

The other two countries (Luxembourg and Portugal) do not have their own printing works and buy their banknotes from private printers.

Alternative materials

Like all the banknotes of the Member States of the European Union, Euro banknotes will be printed on fiduciary paper, which is particularly difficult to imitate. The Commission had considered the possibility of printing these banknotes on a plastic material, polymer. To this end, the European Monetary Institute had, it seems, made contact with the Belgian chemical group UCB[12]. The advantage of plastic banknotes is that they can be used far longer, primarily because they cannot be torn. The life of a plastic banknote is estimated at 32 months, whereas a banknote made of fiduciary paper can be left in circulation for only between 18 and 24 months. However, this advantage is offset by the higher cost (approximately double) of producing plastic banknotes.

The main drawback, which led the Commission to decide as it did, is the one encountered by the Australian central bank[13]: after the banknotes of the Federal Reserve Bank of Australia had been printed on a plastic material, the monetary authorities discovered that the ink, which can only be applied to the surface of the plastic (unlike paper), could be obliterated very easily. The euro banknotes will therefore be printed on conventional fiduciary paper, which is certainly less resistant, but more difficult to imitate, and it entails lower production costs.

Changes to the designs

The design chosen for the back of the euro banknotes has had to be modified. The intention was that the various bridges symbolizing *'communication both among the peoples of Europe, and also between Europe and the rest of the world'* should not be attributable to any particular monument or country. The first designs selected by the European Monetary Institute nonetheless attracted the attention of a specialist in bridges, who pointed out to the EMI that some of the bridges depicted in these designs were very similar to bridges existing now or in the past[14].

The future 500 euro note, for example, showed a suspension bridge, a symbol of *modern 20th century architecture*, which closely resembled the Pont de Normandie (France), and the bridge depicted on the 100 euro note (*Baroque and Rococo*) was very similar (especially the pedestrians and horse-drawn carriages using it) to the old Pont de Neuilly, which spanned the Seine near Paris until 1956. The European Monetary Institute simply stated that the designs selected should certainly

[12] *Financial Times*, quoted by Agence Europe, *Bulletin Quotidien Europe*, No 6860, 25 November 1996

[13] *The Times*, 14 July 1997

[14] *Financial Times*, 14 February 1997

be modified to incorporate the security features. The necessary adjustments have since been made, and the 5 euro note in particular has undergone major changes: the original design showed a floating bridge very reminiscent of a bridge said to have existed in India. It has been replaced by a bridge far more representative of the *classical architecture* it was supposed to depict.

The designs of the euro banknotes have also been modified to incorporate the Canaries, Balearics and Azores, which were omitted from the original designs. A motion for a resolution tabled by three Spanish Members of the European Parliament on behalf of the European People's Party[15] referred to '*the serious shortcomings in the draft design for the euro banknotes, such as the fact that the Canary Islands, the Balearic Islands and the Azores were not included in the map of Europe, which betrays supreme ignorance on the part of the EMI of the geography and politics of the European Union*' and called for '*rectifications to be made immediately to the design for the euro banknotes so as to include therein the regions which were left out*'. The resolution, having noted *'the lack of any mechanism for consulting the European Parliament on the design, ... calls for improved consultation procedures between the EMI and the European Parliament to prevent such unacceptable mistakes from occurring in future*'.

The designs of the second series of euro banknotes are reproduced in the annex[16].

Some interesting statistics

To conclude, the statistics provided by the EMI[17] reveal some interesting facts:

- the value of the banknotes in circulation in the European Union at the end of 1995 was about ECU 375 billion, or about 6% of the EU's gross domestic product (compared to 5% in 1990); the lowest ratio is Finland's (2.5%), the highest Spain's (11.3%);

- only Germany (7.2%), Italy (5.9%) and Spain (11.3%) have seen the ratio of the value of their banknotes in circulation to GDP rise in the past five years, the ratios in the other Member States having remained virtually stable;

- at the end of 1995 the number of banknotes in circulation in the fifteen Member States (including Scottish and Northern Irish banknotes) was 12.7 billion;

- the average number of banknotes per inhabitant in the European Union (at the end of 1995) is 34, the smallest number being 20 in Finland and the highest 50 in Austria;

- the estimated life of a banknote in Europe (on fiduciary paper) is about two years.

[15] PE 256.484 of 23 December 1996 (B4-1234/96)
[16] © European Monetary Institute, 1997
[17] EMI press release, 13 December 1996

THE EURO COINS

Article 105a of the Treaty on European Union (*'Maastricht Treaty'*) states that, while the European Central Bank (ECB) has the exclusive right to issue banknotes, *'Member States may issue coins subject to approval by the ECB of the volume of the issue. The Council may, acting in accordance with the procedure referred to in Article 189c and after consulting the ECB, adopt measures to harmonize the denominations and technical specifications of all coins intended for circulation to the extent necessary to permit their smooth circulation within the Community.'*

Article 189c of the TEU requires the communication of the Council's common position to the European Parliament, which may approve ((b)), amend or, by an absolute majority of its members ((c)), reject it, whereupon *'unanimity shall be required for the Council to act on a second reading'* ((c)). Parliament's first reading took place on 6 November (see page 13).

The Member States *'exercising their competence decided that the coins will have one common face showing a European subject and the value, and one face showing a national symbol surrounded by the 12 stars of the Union'*[18].

The process of selecting the euro coins

The ECOFIN Council meeting in Verona (in Spring 1996) instructed the Commission to organize a competition for the selection of the design of the common face of the euro coins, the choice of the national face being, as we have seen, the responsibility of the Member State governments.

As with the banknotes, a first selection was made at national level in all the Member States (except Denmark), each country being permitted to pre-select no more than three series. The subjects adopted differ slightly from those chosen for the banknotes: *European architecture, symbolism and personalities.* These subjects were chosen in response to concern that the coins should symbolize the European Union, convey a message of European unity and provide a visual representation[19].

From the thirty-six proposals submitted to the Commission, a European jury composed of independent experts and chaired by the Commission chose the nine it considered best in terms of their creativity, aesthetic quality and probable perception by and acceptability to the public[20]; as with the banknotes, complete anonymity was observed throughout the jury's selection procedure. In March and April 1997 the nine anonymous series were also submitted to an assessment by the public[21], a very clear majority (63.8%) of whom picked *'Proposal I'* as the most successful, since it conveyed a simple but attractive image of the European Union, both modern and close to the people. More

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[18] Communication from the Commission to the Council, the European Parliament and the European Monetary Institute, COM(97) 247 final, 29 May 1997

[19] See Commission press release, 17 June 1997.

[20] *idem*

[21] Composed of representatives of the consumers, the blind and visually impaired and large professional users of coins from all the EU Member States except Denmark.

than any of the other series, many of the people questioned found it put across the idea of a united Europe while respecting the heritage of each Member State[22].

The common face of the Euro coins

The series chosen by the Commission after various consultations was designed by Mr Luc LUYCX (Belgium). It sought to be clear, easy to use and comprehensible to everyone and to define the Euro as the currency of Europe and the Europeans. The coins represent the European Union in different ways against a dynamic backdrop composed of stars, the symbol of Europe.

In accordance with the Commission's technical specifications, there are eight coins, which can be broken down into three distinct sequences[23]:

- the first three coins, with face values of 1, 2 and 5 cents[24], indicate Europe's place in the world
- the next three (10, 20 and 50 cents) present the Union as a gathering of nations
- the last two, 1 and 2 Euros, depict Europe without frontiers.

Nonetheless, the Commission emphasizes that the designs which have been unveiled are not the final models, but rather artistic impressions of the future Euro coins. Thus it should be possible to produce the 1 and 2 Euro coins in the two-colour form that has been decided, and they will not include the circular space intended for a security mark. Similarly, the map of Europe will be adapted to ensure that all the Member States are satisfied with the representation of their country[25].

The technical specifications

The tactile features of the coins satisfy the criteria regarding ease of use and recognition. The three sequences (see section 2) differ in shape, weight, colour and thickness.

Various innovative features have been incorporated:

- ➪ differences in the edging of each consecutive coin in the series;
- ➪ a groove on the edge of the 2 cent coin;
- ➪ a 'Spanish flower' shape for the 20 cent coin.

The **metal used to mint** the coins was also chosen carefully to meet public health criteria. Since 1994 the use of nickel in coins has been limited by a Council directive, which was approved by the European Parliament[26]. It appears that excessive use of nickel can cause allergies under certain conditions, even if this has not been shown to be true of the handling of coins. *'Although coins are*

[22] See Commission press release, 17 June 1997.
[23] *idem*
[24] The euro consists of 100 cents.
[25] See Commission press release, 17 June 1997.
[26] Directive 94/27/EC

excluded from this directive, some Member States already use a nickel-free alloy called Nordic Gold in their coinage system for reasons of public health'[27].

Wishing to reduce the nickel content of the future euro coins as far as possible, the Commission has decided that six of the eight coins will be entirely nickel-free. The first sequence of coins (1, 2 and 5 cents, the most frequently used) will be made of copper-covered steel, the second (10, 20 and 50 cents) of *'Nordic Gold'*[28]. Only the 1 and 2 euro coins will contain some nickel because of the additional security features they must incorporate and their high face values. The search for an alternative, containing no nickel, would probably not permit compliance with the timetable set by the European Council in Madrid, which calls for the introduction of the euro banknotes and coins on 1 January 2002 at the latest. The national Mint Directors believe it will take three to four years from the time the decisions are taken until the coins are actually introduced. It should be remembered that some 70 billion coins of the various currencies are currently in circulation in Europe.

The approach proposed by the Commission, however, will result in 92% of coins in circulation containing no nickel, as against a mere 25% today[29]. *'Nevertheless, out of concern for public health, the Commission will [undertake] further research regarding the treatment of metals allowing the allergenic effects of nickel to be neutralised. Furthermore, the Commission will consult the Scientific Committee for Toxicity and Ecotoxicity of Chemical Compounds and make an evaluation of its results'*[30]. This has now been completed.

The designs of the future euro coins and a table summarizing their technical specifications can be found in Annexes 1, 2 and 3.

The quantities to be produced for each country have been calculated as equal to the quantities issued by each Member States minus normal losses in circulation, the loss rates used in the calculations being those determined statistically by the United Kingdom at the time of decimalization. The quantities to be produced by country and denomination are shown in Annex 4.

Parliament gave the Regulation a first reading on 6 November 1997. In its amendments Parliament voted to:

- confirm that there should be a European side and a national side to each coin;
- delete the 2 cent and 20 cent coins;
- make changes to the dimensions of the others in order to link diameter and face value;
- eliminate the nickel content from the alloys of the surface of the coins.

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[27] Communication from the Commission to the Council, the European Parliament and the European Monetary Institute, COM(97) 247 final, 29 May 1997

[28] On 9 June the ECOFIN Council gave its approval subject to verification of the feasibility of producing coins in *'Nordic Gold'* within the period specified.

[29] See Commission press release, 17 June 1997.

[30] Communication from the Commission to the Council, the European Parliament and the European Monetary Institute, COM(97) 247 final, 29 May 1997

THE EURO AND ELECTRONIC MONEY

The preparations for the introduction of the euro in its fiduciary form (notes and coins) should not be allowed to obscure the fact that the vast majority of payments are today made in scriptural form and that a growing proportion of the money supply exists only in non-physical form. The phenomenon known as 'electronic currency' is a technological innovation which those responsible for the future single European currency cannot afford to ignore.

On the initiative of the European Parliament's Committee on Economic and Monetary Affairs and Industrial Policy, and especially its Subcommittee on Monetary Affairs, Parliament's STOA - *Scientific and Technological Options Assessment* - was asked to carry out a study on *'Technological Innovation and Money'*[31]. The following draws heavily on this study. The reader is recommended to consult the full report for further information.

Various aspects of electronic money

The recent phenomenon of *electronic money* actually comprises two distinct technological innovations, even though they both concern new means of making payments: the *'electronic purse'* (smart cards) and the various systems using the Internet, especially the one known as *'digital cash'*.

Although these new products and services are still in their infancy, analyses are needed

- ❒ to anticipate the repercussions of this technological process, which may render obsolete the notion of money as we know it today;

- ❒ to discover the opportunities created by the simultaneous existence of the two processes, Economic and Monetary Union (EMU) and the growing use of electronic money.

In general, the advantages and disadvantages of the new electronic payment systems currently in use can be summarized as follows:

- ❒ **advantages**: greater security, anonymity and privacy, lower transaction costs, easier international payments;

- ❒ **disadvantages**: the products and services are new and therefore untried; possibility of losses if hardware breaks down; need to store and secure transactions; possible emergence of new criminal activities and more effective ways of carrying out existing ones (misuse of funds, tax evasion, trafficking, etc.).

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[31] *'Technological Innovation and Money'*, STOA, European Parliament, PE 166.483, February 1997

The 'electronic purse'

The term *'electronic purse'* covers the use of pre-paid chip cards on which monetary values (of a limited amount) can be loaded and stored, enabling the cards to be used for the payment of goods and services that cost very little and are normally paid for in cash, since most tradesmen accept cheques or credit cards only above a certain value. The electronic purse is therefore intended eventually to replace cash (notes and coins) even in low-value transactions.

From a technical point of view, different systems, perhaps incompatible with one another, are very likely to exist side by side, at least in the initial period after the introduction of the electronic purse. Standards based on the system(s) most frequently used by consumers will certainly appear in the long term and with a high level of compatibility if several standards persist.

The compatibility of different systems will increase the cost of introducing the electronic purse, since the various terminals must be able to read all the cards and to carry out operations on different systems. Compatibility will, however, have the advantage of enlarging the market in which these cards are used, thus reducing the cost of producing and operating the various terminal networks. According to the STOA report, *'however, the forceful imposition of a particular standard could prevent or discourage the technological development of better systems in the future'*[32].

The legal framework of the electronic purse remains unclear. Nonetheless, the European central banks, faced with this issue, have clearly stated that the *'multi-purpose'* electronic purse (i.e. one that is no longer restricted to one provider of a service, such as a telephone card, but can be used for many purposes) is a *payment instrument: 'as the unused amounts are monetary, comparable to sight deposits, the banks alone should be responsible for issuing such instruments'*[33].

The European central banks have also defined the precise nature of this payment instrument: as it *'is intended as a substitute for coins'* (i.e. fiduciary money), it must be *'regarded as a scriptural instrument, since a payment results in an account being debited (whether or not there is an accumulation of debits)'*[34].

The European Monetary Institute (EMI)[35] and the Bank for International Settlements (BIS)[36] have emphasized that the issuers of *electronic purses* should obey the same rules as apply to other, conventional credit institutions, especially when it comes to supervision and prudential rules.

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[32] *idem*

[33] *'Porte Monnaie Electronique: des avancées'* by Hubert Jacquet, in: ECU-EURO, 1995 IV

[34] *idem*

[35] See EMI (1994), *'Report to the Council of the European Monetary Institute on Prepaid Cards'*, Working Group on EU Payments Systems, May 1994.

[36] See BIS (1996), *'Implications for central banks of the development of electronic money'*, Basle, October.

Internet and 'digital money'

As a growing number of people are using the Internet, it has been possible to develop on-line financial services that can be accessed by the general public from personal computers.

The progressive approach adopted by the majority of credit institutions initially enabled them to provide financial information on line, electronic mail permitting more complex and detailed questions to be answered. As a second stage the Internet services have proposed services similar to those provided by vending machines, thus making them point-of-sale terminals.

The STOA report claims that in a few years it should be possible for a new stage to be completed with the circulation of the banks' own digital money on the Internet. *'One key issue for the success of such a scenario is, obviously, the use of the PC as a key delivery channel together with smart card technology'*[37].

The mechanisms for payment on the Internet can thus be divided into three broad classes according to technology used:

- ➪ systems based on *credit cards*, where payment is made through the existing credit card infrastructure;

- ➪ *credit-debit systems*, where payment requires reference to the issuer;

- ➪ *electronic cash* systems, where payment is made independently of the issuer (with electronic purses connected to the net, for example).

The development of the concept of *electronic money* will therefore essentially depend on two factors: on the one hand, technological progress made in introducing systems that are easily accessed and used by everyone; on the other hand, the necessary standardization of the various systems so as to ensure the greatest possible compatibility among them. The development of the use of PCs (or terminals) continues to be a prerequisite, of course, but is far more a matter for societal evolution.

As with the *electronic purse*, the development of *electronic cash* must be accompanied by the introduction of rules governing the systems for transferring capital on the Internet. This will be far more difficult than for *electronic purses* because of the technological aspects of the Internet, which are currently subject to (virtually) no rules.

The monetary authorities will thus have to consider the risks of the uncontrolled creation of money, of fraud and tax evasion and, above all, of the possible instability of the balance of capital and, therefore, exchange rates.

Genuine monitoring will be possible only if the monetary authorities have real powers to supervise, investigate and monitor not only the issuer but also the beneficiary of a capital transfer. The STOA report compares this system to the one that currently exists for payments made by credit card. Such

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[37] *'Technological Innovation and Money'*, STOA, PE 166.483

a supervisory and risk-prevention system can be introduced only at international level, beginning at European level but also at global level, comparable to the role played by the Bank for International Settlements (Basle) for capital transfers and the banking industry. The BIS has also given this matter some thought[38].

The single currency and electronic money

What must not be overlooked when the change is made to the Single Currency is the technological revolution that the various aspects of electronic money represent.

The physical introduction of the Euro (notes and coins) will make it necessary to modify many vending machines that accept national notes and coins and the note dispensers in all the Member States (in 1999 or later) in the *euro area*. The intervening period will provide an opportunity for the electronic money technologies, since certain modifications may be made at the same time for the two 'revolutions': the introduction of the Euro and the widespread use of electronic money.

The STOA report emphasizes that, having a comparative advantage as regards the technology of pre-paid cards ('smart cards'), Europe - and therefore its enterprises - may be able to gain a foothold in a market where there will undoubtedly be major developments in the next few decades, although the technical specifications are still in their infancy.

The widespread use of electronic money might aid the introduction of the Euro in several ways:

- freedom to move within the European Union, in the Euro area *and* in the countries belonging to the future EMS2, without having to worry about physically carrying different currencies;

- exchanges rates would not need to be calculated between the various national currencies and between these currencies and the Euro;

- greater transparency (given proper regulation), which would reduce the distance between the citizens of the *in* countries and the *out* countries and form a bridge that could be used by all citizens between the two;

- the creation of a large electronic Euro market, which would very quickly enable a critical mass of operations effected in Euro to be achieved;

- a reduction of the cost of making the transition to the Euro (in terms of information and payment facilities) and an acceleration of the transition to the single currency: the transitional period (with all its dangers) could thus be reduced appreciably;

[38] See BIS (1996), *'Implications for central banks of the development of electronic money'*, Basle, October.

➪ ideally, provided that a critical mass of transactions effected in electronic money is achieved, a reduction in the number of Euro notes and coins actually in circulation; the cost of producing them could thus be reduced and the timetable brought forward.

The many advantages that might be derived from the introduction and widespread use of electronic money, with a view to the changeover to the single currency, are, however, subject to some major hypotheses:

- the early adoption of standards relating to electronic payment and electronic purse systems, giving extensive compatibility *at European level*;
- the hypothesis that the deadlines set (i.e. until 1 January 2002) leave enough time for these technological developments;
- the real change of attitude, far harder to achieve, that will ensure the widespread use of electronic media and popular acceptance of the dematerialization of money.

CONCLUSIONS

The European Monetary Institute, the Member States and the Commission have defined the future Euro notes and coins, taking account of the specific needs of consumers and public health aspects.

As it will take three to four years to print the notes and mint the coins, the Commission submitted a *proposal for a Council regulation (EC)* to the European Council in Amsterdam[39], aimed at *'allowing for an early political agreement, such that its formal adoption will be a mere formality'*. Now that the Council has given its political endorsement[40], *'the remaining stages of the decision-making procedure (co-operation with the European Parliament in accordance with Article 189c and consultation of the EMI) will also proceed on the same informal basis, allowing coin production to begin before the Regulation enters into force'*, scheduled for 1 January 1999.

The Commission's initiative is aimed at enabling the printing of notes and the minting of coins to begin as soon as the list of Member States participating in the Euro area has been adopted by the European Council (before 1 July 1998[41]) rather than on 1 January 1999, representing a considerable saving of time and bringing forward by six months the irreversibility of the Euro's introduction. Nevertheless, the procedure adopted - consisting in having the European Council endorse a proposal for a Council regulation *before the European Parliament has given its approval* and the European Monetary Institute has been consulted - deprives these two bodies, and especially the European Parliament, of an opportunity of expressing their views on a subject that continues to be delicate in some countries of the European Union and, if needs be, of forcing the European Council to take a unanimous decision[42].

Recent technological developments in the field of *electronic money* provide major opportunities for European monetary integration. It may be asked, however, whether the citizens of Europe are ready to accept two major revolutions at once: the abandonment of national notes and coins on the one hand and the dematerialization of money, a significant *'psychological leap'*, on the other. Success in responding to this dual challenge would enable Europe to enter the 21st century fully prepared, with an edge on its American and Japanese competitors in financial and monetary technology.

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[39] *Communication from the Commission to the Council, the European Parliament and the European Monetary Institute*, COM(97) 247 final, 29 May 1997

[40] *Amsterdam European Council - Presidency Conclusions*, General Secretariat of the Council of the European Union, 16 and 17 June 1997

[41] Article 109j(4) of the TEU

[42] Unanimity is required if the European Parliament rejects the common position submitted to it by the Council: Article 189c(c), (d) and (e).

ANNEXES

- *Annex 1* : Designs for the euro coins
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- *Annex 2* : Shape of the 20 cent coin, known as the 'Spanish flower'
  (Official Journal of the European Communities)

- *Annex 3* : Unit values and technical specifications of the euro coins
  (Official Journals of the European Communities)

- *Annex 4* : Number of coins of the nearest value in ECU in circulation on 31 December 1993

- *Annex 5* : Second series of designs for the euro banknotes
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Annex 1 : Designs for the euro coins

Annex 2 : Shape of the 20 cent coin, known as the ’Spanish flower’

(Official Journal of the European Communities)

Annex 3

Unit values and technical specifications of the coins denominated in euro							
Face value (euro)	**Diameter in mm**	**Thickness in mm**	**Weigh t in gr**	**Shape**	**Colour**	**Composition**	**Edge**
2	25.75	1.95	8.5	Round	Ext.part: white Int.part: yellow	Copper-nickel (Cu75Ni25) three-layer Nickel-brass/Nickel/Nickel-brass CuZn20Ni5/Ni12/CuZn20Ni5	Edge lettering Fine milled
1	23.25	2.125	7.5	Round	Ext.part: yellow Int.part white	Nickel-brass (CuZn20Ni5) three-layer Cu75Ni25/Ni7/Cu75Ni25	Interrupted milled
0.50	24.25	1.69	7	Round	Yellow	Nordic Gold Cu89Al5Zn5Sn1	Coarse milled
0.20	22.25	1.63	5.7	'Spanish flower' shape	Yellow	Nordic Gold Cu89Al5Zn5Sn1	Plain
0.10	19.75	1.51	4.1	Round	Yellow	Nordic Gold Cu89Al5Zn5Sn1	Coarse milled
0.05	21.75	1.41	3.9	Round	Red	Copper covered steel	Smooth
0.02	18.75	1.36	3	Round	Red	Copper covered steel	Smooth with a groove
0.01	16.25	1.32	2.2	Round	Red	Copper covered steel	Smooth

Source: COM(97) 247 final

Annex 4

Number of coins of the nearest value in ECU in circulation on 31 December 1993 (in millions)									
Country	**2 ECU**	**1 ECU**	**0.5 ECU**	**0.2 ECU**	**0.1 ECU**	**0.05 ECU**	**0.02 ECU**	**0.01 ECU**	**Totals**
Austria	14.76	164.41	217.44	0	611.77	224.41	646.24	0	1879.03
Belgium	0	178.05	346.57	0	560.32	0	1180.8	230.48	2496.22
Denmark	49.00	50.00	53.00	93.00	138.00	175.00	226.00	0	784.00
Finland	45.00	32.00	63.00	102.00	112.00	140.00	420.00	420.00	1334.00
France	1 054.6	365.2	172.5	1372	875.7	1728	1800	2848.4	10207.40
Germany	791	977	1801	1666	0	5162	3259	7456	21112
Greece	0	0	128.7	140.6	282.3	272.6	300.7	191.2	1316.1
Ireland	0	61.83	47.11	82.85	232.41	132.29	297.59	406.05	1260.13
Italy	0	0	1707.1	1633	2467.8	1731.61	249.44	1132.94	9101.94
Luxembourg	0	10.04	11.40	0	23	0	45.60	12.70	102.74
Netherlands	207.8	177.4	528.8	0	283	340.7	314.1	0	1851.8
Portugal	0	43.89	130.81	102.43	197.81	124.64	228.23	133.86	961.67
Spain	237.33	101.3	949.3	189.53	1581	252.92	1893.58	1149.56	6355.13
Sweden	0	75	75	50	300	100	200	200	1000
UK	0	974	507	1394	1269	2491	3641	5973	16249
Totals	**2390.49**	**3210.12**	**6738.73**	**6825.41**	**8934.77**	**12875.17**	**14882.28**	**20154.19**	**76011.16**

Source: Official Journal of the European Communities

Annex 5 : First series of designs for the euro banknotes