

The demand for currency in the euro area and the impact of the euro cash changeover

This article discusses the main determinants of currency demand in the euro area with a specific focus on the impact of the introduction of euro banknotes on currency demand. Currency is held for transactions, and for precautionary and speculative purposes. Transaction-related variables (such as private consumption) and opportunity costs of holding currency (for instance in the form of lost interest income), as well as additional factors, such as the demand for currency from abroad and taxes and regulations, play an important role in the demand for currency.

In the run-up to the cash changeover, primarily in 2001, currency holdings fell substantially, largely owing to a decline in the amount of hoarded banknotes. In the first eleven months following the euro cash changeover, currency in circulation rose substantially, mainly as a result of the replenishment of currency holdings by euro area residents as well as the recovery of demand for euro banknotes outside the euro area. Nonetheless, in November 2002 there remained a gap between the current level of currency in circulation and the level which was observed at the end of 2000. However, at the current juncture, it is too early to draw firm conclusions as to whether or not the introduction of euro banknotes has led to a structural change in the demand for banknotes.

I Introduction

On 1 January 2002 the euro banknotes and coins replaced those of the 12 euro area countries. This had a major impact on currency in circulation in 2001 and 2002. Looking ahead, this may, however, also have implications for the demand for currency in the euro area in the longer term. Against this background, the euro cash changeover provides a good opportunity to examine some of the aspects of the demand for currency.

Section 2 of this article presents the main determinants of currency demand in the euro area. Section 3 examines the main

developments in the run-up to the euro cash changeover. Section 4 analyses the demand for euro banknotes and coins in the period following the cash changeover using the information available. Finally, Section 5 concludes on the basis of the analysis in the previous sections. This article contains three boxes. Box 1 provides a definition of banknotes and currency in circulation. Box 2 discusses the impact of the cash changeover on the monetary aggregates M1 and M3, and Box 3 presents evidence on the demand for euro banknotes and euro-denominated deposits outside the euro area.

2 The main determinants of the demand for currency in the euro area

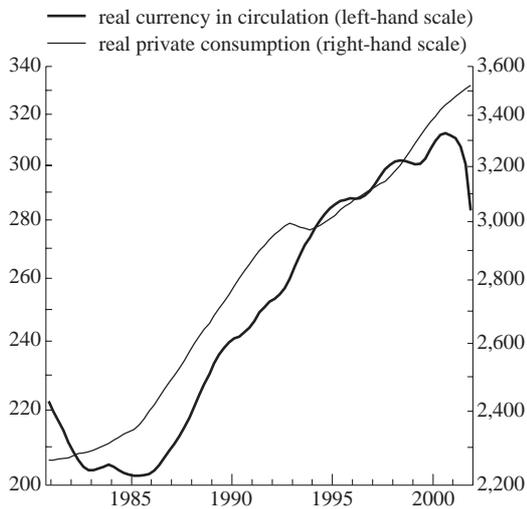
The demand for currency (see Box 1 for definitions) is mainly determined by its use for transactions as well as for precautionary and speculative purposes. It is positively related to transaction variables, such as output, private consumption or retail sales, and negatively related to the opportunity cost of holding currency, such as, for instance, short-term interest rates measuring the financial return which could be earned by investing in alternative assets. In addition to these determinants, the

demand for currency in the euro area depends on other factors, such as the demand for banknotes from abroad, taxes and regulations, the informal economy or the substitution of currency for alternative payment instruments.

In the past, the heterogeneity in developments in the determinants of currency demand in the 12 euro area countries has led to considerable differences in the demand for currency. This is reflected, for instance, in

Chart 1 Real currency and real private consumption in the euro area

(in EUR billions; logarithmic scale)



Source: ECB.

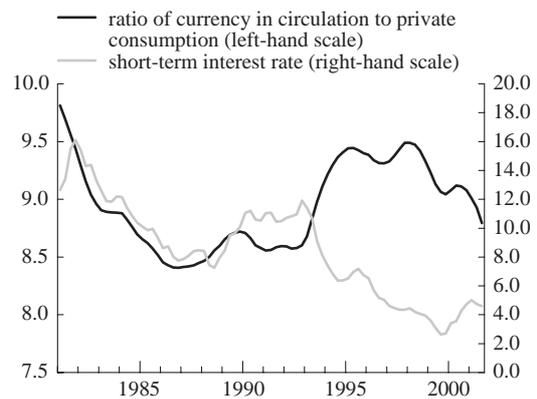
Note: Quarterly average of the stock of currency in circulation, deflated by the private consumption deflator. Annualised real private consumption.

the ratios of currency to private consumption in the 12 euro area countries (see Table 1). At the same time, however, the ratio of currency to private consumption remained relatively stable for the euro area as a whole between 1980 and 2000, at a level of around 9% to 10%.

As noted above, currency holdings generally increase in parallel with a higher level of real transactions. As currency is, to a large extent, used for small and medium-size purchases, private consumption may serve as an appropriate variable to reflect the transaction purpose of currency. As can be seen from Chart 1, real currency holdings in the euro area increased broadly in line with real private consumption in the last two decades. In

Chart 2 Ratio of currency to private consumption and opportunity costs of holding currency

(in percentages; quarterly figures)



Source: ECB.

Note: The short-term interest rate is a GDP weighted average of the short-term interest rates in the euro area countries.

Table 1 Ratio of currency in circulation to private consumption

(in percentages)

	1980	1985	1991 ¹⁾	1995	1998	1999	2000	2001
Euro area	10.0	9.2	8.8	9.6	9.4	9.3	9.2	8.0
Belgium ²⁾	16.9	12.5	10.0	8.5	8.3	8.6	8.5	7.4
Germany ¹⁾	9.6	9.6	9.8	11.2	11.1	10.8	10.6	8.8
Greece	14.2	11.9	9.8	8.1	8.0	8.3	8.1	7.7
Spain	10.4	10.3	14.1	16.4	15.6	15.2	14.8	13.1
France	9.0	7.6	6.8	6.0	5.7	5.6	5.7	4.8
Ireland	4.4	6.6	7.4	7.5	8.0	9.2	8.8	7.6
Italy	9.5	8.4	8.1	8.7	8.6	8.9	9.1	8.8
Luxembourg ²⁾	6.9	5.9	4.4
Netherlands	11.6	12.6	12.8	11.3	9.6	8.8	8.2	6.5
Austria	12.1	10.4	9.8	9.9	9.4	9.4	9.7	8.9
Portugal	15.7	9.8	8.3	7.4	6.5	6.7	7.0	6.6
Finland	3.8	3.3	3.2	3.8	4.1	4.1	4.0	3.9

Sources: ECB, NCBs, Eurostat, national accounts.

Note: Partly estimated for Ireland, Portugal and Luxembourg. From 2001, euro area data include Greece.

1) West Germany before 1991.

2) The figures for Luxembourg are included in the figures for Belgium before 1999.

Box I

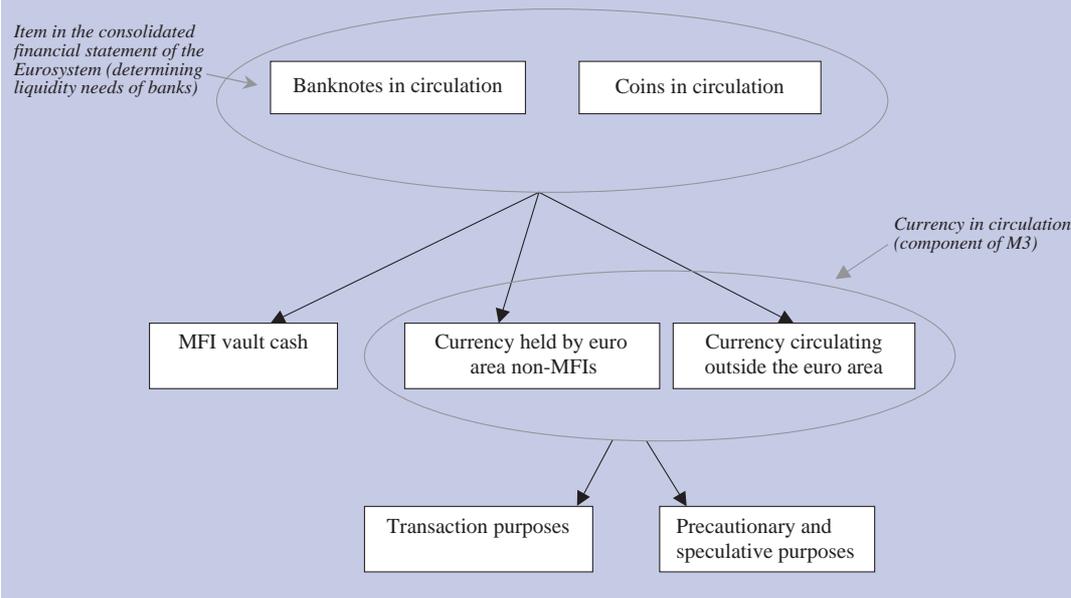
Definition of banknotes and currency in circulation

This box briefly describes the terms banknotes and currency in circulation that are used in this article to analyse the demand for currency in the euro area.

The euro *banknotes* are issued by the Eurosystem. They are an important determinant of the liquidity needs of banks in the context of the ECB's monetary policy operations. By contrast, euro coins are issued by the central governments of the euro area countries.

The term "*currency in circulation*" (in the article, the term "*currency*" is often used as a synonym) has a narrower range than banknotes and coins in circulation as it includes only banknotes and coins held by non-MFIs, i.e. it does not include vault cash of euro area MFIs. Currency in circulation is a component of the broad monetary aggregate M3. In November 2002 its share was 6% of the amount outstanding for this aggregate. The holders of banknotes and coins outside the euro area MFIs are unknown. Therefore, currency in circulation does not only contain holdings of the euro area non-MFI sector, but also currency holdings from abroad.

The definition of banknotes and currency in circulation



particular, the demand for low-value banknotes depends on the level of transactions.

By contrast, mainly reflecting the holding of currency for precautionary and speculative purposes, a decrease in the *opportunity cost* of holding currency generally increases the demand for currency. In particular, large-value banknotes in circulation, which are well suited as a store of value, are normally positively affected by a fall in the opportunity costs of holding currency. As can be seen from Chart 2, this has been the case for the euro area particularly since the

1990s, during which nominal interest rates fell to relatively low levels.¹

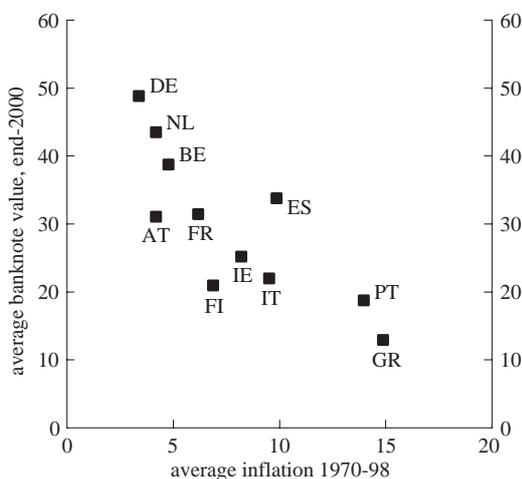
In addition to the nominal interest rate, which might be broken down into a real interest rate and expected inflation, actual inflation also reflects the cost of holding currency, as this reduces the value of financial assets, by contrast with real assets. In this respect, it is interesting to observe that, as can be seen from Chart 3, in countries with a high inflation

¹ In times of high interest rates, the demand for currency may be relatively inelastic to interest rate changes.

Chart 3

Average banknote value and average inflation in the euro area countries

(in EUR; annual figures in percentages)



Source: ECB.

average over the period between 1970 and 1998, the average legacy banknote value (i.e. the total value of banknotes in circulation divided by the number of banknotes in circulation), converted to euro, was relatively low at the end of 2000. Conversely, it was particularly high in countries with low inflation (and low interest rates), which may explain the importance attached to the use of currency, and particularly the use of large-value banknotes, for hoarding purposes in these countries.²

In addition, currency developments in the euro area reflect foreign demand for the euro legacy currencies. In this context, it is important to note that, owing to the anonymity of currency, it is generally very difficult to determine the amount of currency circulating abroad. While there are some direct indications based on available statistics on cross-border shipments of banknotes via the banking system and on surveys, as well as some indirect indications based on econometric estimations, there are no statistics on the exact amount of currency circulating outside the home currency area.

Economic agents in currency areas with less stable monetary regimes may have held euro

area currencies as a store of value, in particular euro area currencies which had a tendency to appreciate in the past. The demand by non-residents for large-value banknotes, which are particularly appropriate for hoarding, was especially high.

In this respect, the demand for legacy banknotes from abroad varied considerably across the euro area countries in the last two decades. Of the euro legacy currencies, the Deutsche Mark was most widely held abroad. The Austrian schilling and the French franc were also held abroad, albeit to a much more limited extent. Worker's remittances, tourism flows, the political and economic transformation of central and eastern Europe at the end of the 1980s – initially implying an abrupt upward adjustment of domestic prices – and the war in the former Yugoslavia with its subsequent hyperinflation were all factors contributing to a higher demand for the Deutsche Mark. According to a study published by the Deutsche Bundesbank, it was estimated that around 30% to 40% of Deutsche Mark banknotes were circulating abroad in the mid-1990s, probably largely in central and eastern Europe, the western Balkans and Turkey, corresponding to around €35 to €45 billion at that time.³ In the second half of the 1990s, by contrast, the stabilisation of the situation in eastern Europe probably led to a fall in the demand for euro legacy currencies in these countries.

Furthermore, *taxation of labour and capital income* as well as fiscal controls of tax payments have been important factors in explaining the demand for currency in euro area countries. These factors typically affect the amount of currency transfers abroad and the size of the *informal economy*, in which currency, owing to its anonymity, is to a large

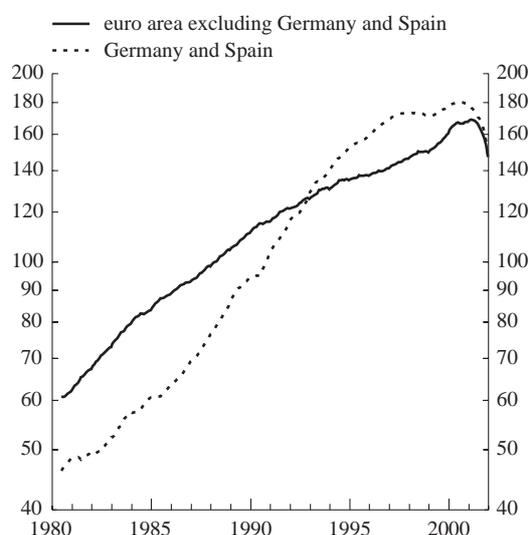
² For the denomination structure of the legacy banknotes of the euro area countries, converted to euro, see Table 1 in the article entitled "Implications of the euro cash changeover on the development of banknotes and coins in circulation" in the May 2002 issue of the ECB's Monthly Bulletin.

³ See F. Seitz, "Circulation of Deutsche Mark Abroad", Discussion Paper 1/95, Deutsche Bundesbank, 1995. Holdings of US dollar currency abroad are estimated at around 60%. See R. Porter and R. Judson, "Overseas Dollar Holdings: What do we know?", *Wirtschaftspolitische Blätter*, 2001, 48 (4), pp. 431-440.

extent used.⁴ Partly as a result of changes in national tax regulations, the average annual rate of change of currency in circulation between 1986 and 1994 was more than twice as high in Germany and Spain (together 10.6%) as in the euro area excluding these two countries (4.2%) (see Chart 4).⁵ In Germany, both the announcement of the introduction of withholding tax on interest income from financial assets in 1987 and the decision by the Federal Constitutional Court on the taxation of capital gains in 1991 led to a substantial increase in currency holdings.⁶ In Spain, currency in circulation also rose considerably during that period owing to the introduction of a law in 1985 on a more homogeneous fiscal treatment of capital gains from financial assets⁷, as well as the introduction of a value added tax in 1986 which led to a rise in tax evasion transactions.⁸

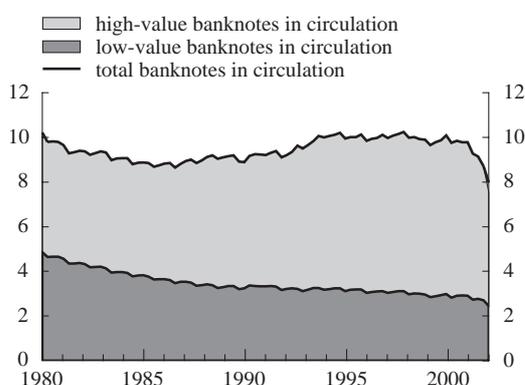
In the last two decades, the increasing use of cashless payment instruments also contributed towards reducing the demand for currency for transaction purposes. This is reflected, for instance, in the slightly declining ratio of currency in circulation to the monetary aggregate M3 observed since the beginning of

Chart 4
Currency in circulation in selected euro area countries
(in EUR billions; six-month moving average; logarithmic scale)



Source: ECB.

Chart 5
Developments in low and high-value legacy banknotes in the euro area
(in value terms as a percentage of private consumption)



Source: ECB and NCBs.

Note: Euro legacy banknotes have been converted into euro (with the fixed conversion rates) and aggregated. Low-value (high-value) euro legacy banknotes are defined as up to (above) €49.

the 1980s. While this ratio was around 9% on average in 1980, it declined to 7.1% in 2000 (and to 6.1% in 2001 as a result of the cash changeover). In line with this, the use of payment cards, such as debit and credit cards, in relation to private consumption is generally greater in those countries in which the ratio of currency to private consumption is relatively low, as for instance in Finland, where non-cash payments have a long tradition. By contrast, in Spain in particular, but also in Germany, Greece, Italy and Austria, the use of payment cards has been relatively moderate.

In this context, it is worth mentioning that in some countries there are legal regulations in place which enforce the use of cashless payments. In France, for instance, the use of currency for large-value payments and for

4 For estimates of the size of the informal economy, see Schneider, F., Enste, D. H., "Shadow Economies: Size, Causes, and Consequences" in the *Journal of Economic Literature*, Vol. XXXVIII, March 2000, pp. 77-114.

5 In Germany's case, this was also partly a result of the political and economic transformation in central and eastern Europe.

6 See the article entitled "Circulation of the Deutsche Mark – from currency reform to European monetary union" in the Deutsche Bundesbank's March 2002 Monthly Report.

7 Ley 14/1985, de 29 de mayo, de Régimen Fiscal de Determinados Activos Financieros.

8 See the article entitled "Determinantes de la demanda de efectivo en España" in the Banco de España's March 1996 Economic Bulletin.

salary payments is limited by law. In Belgium, merchants are obliged to accept certain cashless payment instruments for large-value payments. In the Netherlands ministries are required by law to promote the use of bank transfers for payments to the state, while in Finland there is a legal act in place for cashless rent payments.

Finally, it is worth noting that, in relation to private consumption, the share of large-value euro legacy banknotes (in the context of this article defined as legacy banknotes with a value of more than €49) in the value of total

euro legacy banknotes in circulation increased considerably between 1980 and 2000. Conversely, the share of low-value legacy banknotes (with a value of up to €49) declined during the same period, especially during the 1980s (see Chart 5). This presumably reflects both an increase in the importance of hoarding and the depreciation of the value of banknotes in real terms. At the end of December 2000, the share of large-value legacy banknotes accounted for 70% of the total value of euro legacy banknotes in circulation. The average banknote value at that time was €36.

3 The run-up to the euro cash changeover

In 2001 currency developments in the euro area were dominated by the run-up to the euro cash changeover. During this period, as well as in the period following the cash changeover, it was to a large extent not possible to explain currency developments in the euro area by the standard economic determinants of currency demand. It would appear that, in the run-up to the cash changeover, currency developments were mainly affected by a fall in hoarded legacy

banknotes in the euro area and abroad, which had been held as a store of value or used in the informal economy. This reflected the need to exchange them for euro banknotes or to move them to a bank account for the purpose of conversion into euro. The impact of the decline in currency in circulation on monetary aggregates in the euro area was, however, limited, as most of this decline was compensated for by shifts in other components of these aggregates (see Box 2).

Box 2

The short-term impact of the euro cash changeover on monetary aggregates

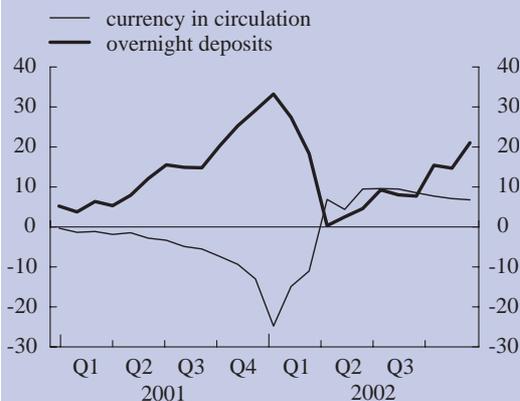
This box analyses the impact of the cash changeover on monetary developments. Currency in circulation only contributed 6% to the outstanding amount of the broad monetary aggregate M3 in November 2002. This notwithstanding, the question arises whether the sharp decline in currency in circulation in 2001 and the strong recovery of these holdings in 2002 significantly influenced monetary developments.

According to the evidence available, most of the reduced demand for cash was mirrored by a stronger demand for other components of M3. It seems that the main substitute for the returning euro legacy currency banknotes in 2001 was overnight deposits. These deposits have risen either directly, via the payment of banknotes into a bank account, or indirectly, via the cash purchase of goods and services from other economic agents belonging to the money holding sector. The chart below illustrates the close link between the reduction of currency and the simultaneous marked increase in overnight deposits in 2001. Furthermore, econometric models of M1¹, consisting of both currency and overnight deposits, do not show a negative shock for the demand equation for M1 in 2001, thereby supporting the hypothesis that to a very large extent the substitution of currency with other assets has taken place within M1. Finally, other assets included in M3, e.g. short-term deposits other than overnight deposits, are obvious alternative candidates for substitution. Therefore, it is likely that most of the reduction in currency in circulation has been mirrored by corresponding increases in other assets

¹ For example the M1 demand model of Stracca L. (2001), "The functional form of the demand for euro area M1", ECB Working Paper No. 51.

Overnight deposits and currency in circulation

(three-month average of monthly flows in EUR billions)



Source: ECB.

M3, for example euro-denominated deposits or deposits in local currency outside the euro area. In addition, the developments in other major currencies in 2001 and 2002, as described in Sections 3 and 4 of this article, suggest that to a relatively limited extent legacy banknotes were exchanged for other currencies' banknotes, mainly US dollars and Swiss francs. In the meantime, however, most euro legacy banknotes held abroad before the euro cash changeover seem to have been substituted for euro banknotes. This implies that most of the limited impact on M3 is likely to have dissipated by the autumn of 2002.

included in M3. In early 2002, the strong recovery in currency was accompanied by opposite developments in overnight deposits (see chart), confirming that a substantial part of the recovery of currency stems from asset substitutions within euro area M1.

While a significant effect of currency substitution on M3 can be rejected on the basis of the above evidence, it cannot be excluded that annual M3 growth might have been dampened slightly, principally at the end of 2001. This is mainly suggested by anecdotal evidence on the substitution of euro legacy banknotes with other assets outside M3 by non-residents in particular. The flowback of euro legacy banknotes in 2001 from outside the euro area might have led to a slight reduction in monetary aggregates, since non-residents are likely to have shifted these funds to assets outside

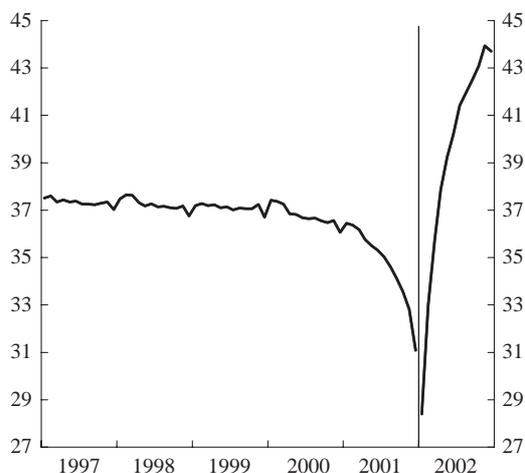
Between December 2000 and December 2001 currency in circulation fell by €116 billion, i.e. the outstanding amount fell by nearly one-third. Evidence of a substantial

decline in currency hoarding is reflected in the significant fall, by around 30% between December 2000 and December 2001, in large-value legacy banknotes, which were mainly used for hoarding purposes. By contrast, low-value legacy banknotes in circulation declined by only around 20% over the same period. In addition, their decline was concentrated in December 2001, reflecting the use of these low-value banknotes for transactions, while the large-value banknotes had already declined substantially in the second half of 2001. Consequently, the average value of the legacy banknotes fell from €36 in December 2000 to €31 in December 2001 (see Chart 6).

Chart 6

Average banknote value in the euro area

(in EUR)



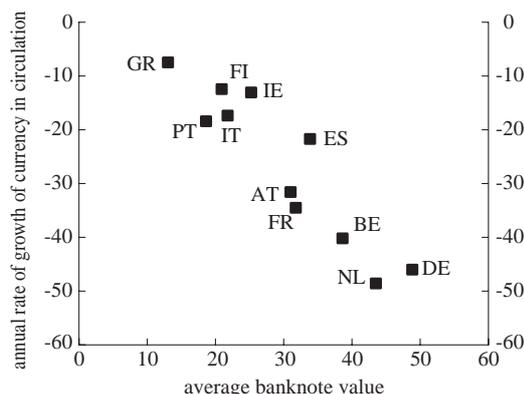
Source: ECB; partly estimated.

Note: For the period before 2002, euro legacy banknotes have been converted into euro (with the fixed conversion rates) and aggregated. From 1 January 2002 onwards, only EUR banknotes are taken into account.

This particularly significant decline in hoarding is further supported by the fact that in the run-up to the cash changeover currency in circulation fell most markedly in those countries in which the value of the legacy banknotes had been highest (see Chart 7). In particular, in Germany and the Netherlands, which had the highest-value legacy banknotes (i.e. the DEM 1,000 and the NLG 1,000

Chart 7
Annual rate of growth of currency in circulation in December 2001 and average banknote value in December 2000

(in EUR; annual figures in percentages)



Source: ECB.

Note: Data for Luxembourg is not included, since banknotes from Belgium were used also in that country.

banknotes), this decline in currency in circulation between end-2000 and end-2001 was most pronounced of all, at -46.0% and -48.6% respectively. By contrast, the annual rate of change of currency in circulation in Greece, which had the lowest average value of legacy banknotes in circulation, was only -7.2% in December 2001.

There appears to have also been a decline in the hoarding of euro legacy currencies by non-euro area residents in 2001. As mentioned above, in central and eastern Europe, the western Balkans and in Turkey, euro legacy banknotes were, to a great

extent, used mainly as a store of value and, to some extent, for transactions as well. While euro legacy banknotes were in part held until the end of 2001 in order to exchange them directly for euro banknotes, there are also indications that non-euro area residents substituted their euro legacy banknotes for euro-denominated deposits in their home countries (see Box 3).⁹

In fact, the euro cash changeover may even have worked as a catalyst in increasing the holdings in local bank accounts in some central and eastern European countries as a result of increased confidence in both the domestic banking sectors and currencies of these countries following a period of several years of lower inflation and greater stability in the banking sectors compared with previous years. The banking sectors of several central and eastern European countries and the western Balkans countries even promoted this exchange process by offering favourable conditions for the exchange of euro legacy banknotes for euro-denominated or local currency assets when opening a local bank account. The euro cash changeover thus offered the banking sector in these countries the opportunity to increase their deposit liabilities. Euro-denominated deposits in central and eastern Europe, the western

⁹ For evidence on the substantial exchange of euro legacy banknotes for euro banknotes and local currencies in central and eastern Europe see H. Stix, "The euro in central and eastern Europe – survey evidence from five countries", CESifo Forum, 3/2002 commissioned by the Oesterreichische Nationalbank and conducted by Gallup.

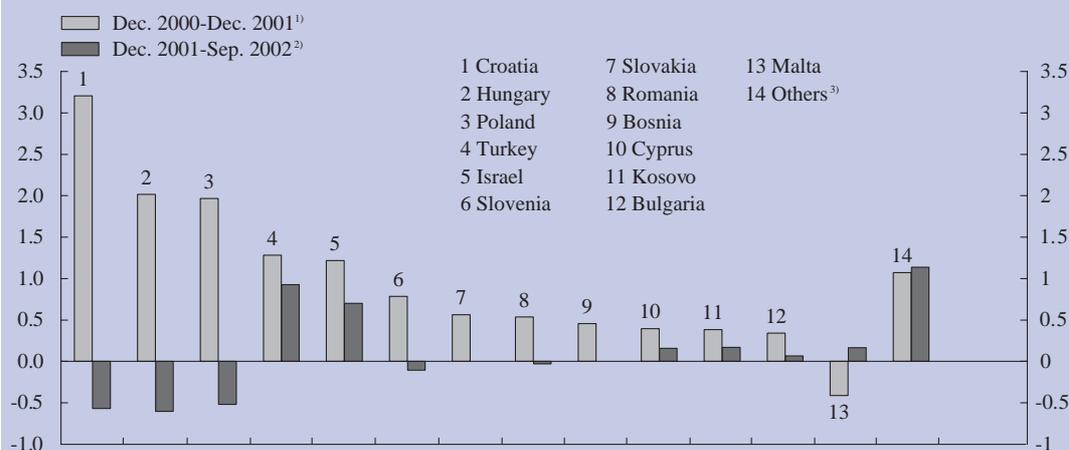
Box 3
The demand for euro banknotes and euro-denominated deposits abroad¹

The introduction of the euro banknotes and coins in January 2002 was a unique opportunity for the ECB to gather information on the demand for euro banknotes abroad, as the cash changeover implied the conversion of euro legacy banknotes into euro banknotes. The transfer of banknotes to third countries – conducted through the banking system – is likely to provide a good estimate of the demand for euro banknotes from abroad in 2002, as it is reasonable to assume that such shipments by banks of euro banknotes to destinations outside the euro area in early 2002 were the main channel of euro banknote outflows and were used principally to convert the stock of outstanding legacy banknotes outside the euro area.

¹ A more detailed account of the use of the euro as a parallel currency in third countries is provided in the ECB's 2002 Review of the international role of the euro.

Changes in euro-denominated bank deposits

(in EUR billions; ordered according to the absolute increase in euro-denominated bank deposits in 2001)



Sources: Respective central banks and ECB calculations.

Note: No data available for most of 2002 for Albania, Bosnia and Herzegovina, FYR Macedonia, Lithuania, Slovakia, Belarus and Ukraine.

1) For Hungary and Slovakia: December 2001 versus June 2001.

2) For Croatia: June 2002, for South Africa: August 2002, for Moldova: May 2002. Montenegro introduced a new series in 2002.

3) FR Yugoslavia (Serbia), Latvia, South Africa, Egypt, Estonia, Albania, Macedonia (FYR), Morocco, Lithuania, Belarus, Moldova, Ukraine, Montenegro, Lebanon.

According to the information available, cumulated net shipments of euro banknotes – including the initial amount supplied during the frontloading period in December 2001 – amounted to around €27 billion at end-October 2002. A significant share of the frontloading and initial shipments was targeted at central and eastern European countries, the western Balkans, Turkey and other countries in the Mediterranean, where evidence had previously pointed to a substantial demand for euro legacy banknotes as a store of value and for conducting large-value transactions. Estimates available from the central banks of Bulgaria, Croatia, Kosovo, Serbia and Slovenia suggest that one-fifth of the amount shipped outside the euro area is held in these countries. At the same time, with the possible exception of Turkey, shifts from euro legacy banknotes to other currencies, whether foreign or domestic, seem to have been limited. Furthermore, in Russia, where the US dollar has been the dominant foreign currency, foreign cash transactions by authorised banks have increasingly involved the euro. According to data published by the Central Bank of Russia, in mid-2002 customers' purchases of euro even approached the level of US dollar purchases. This suggests that for the purpose of tourism the demand for foreign currency is now more evenly spread between the euro and the US dollar in that country.

There is evidence that the cash changeover was associated with a substantial increase in demand for euro-denominated deposits (see the chart above). A survey conducted by the ECB in co-operation with the central banks of 30 neighbouring countries showed that euro-denominated deposits rose by more than €13.5 billion (around 40%) in 2001, with the bulk of the increase taking place in the run-up to the cash changeover at the end of the year. One reason underlying this strong increase is that individuals have deposited their euro legacy currency holdings in the banking system, reflecting the greater stability of the banking systems in the regions concerned as well as favourable conditions for the exchange of euro legacy banknotes when opening a bank account. In fact, most of the above-mentioned central banks confirmed that the strong increase in euro-denominated deposits in 2001 was related to the euro cash changeover.

The increase in deposits was particularly pronounced in countries in the broad geographical vicinity of the European Union, such as Croatia, Hungary, Poland, Turkey and Israel. In terms of regions, the countries of the former Yugoslavia experienced the largest increase in euro-denominated deposits in 2001, rising by more than 80% (€4.4 billion). Accession countries followed, with an increase of roughly 50% (€4.0 billion).

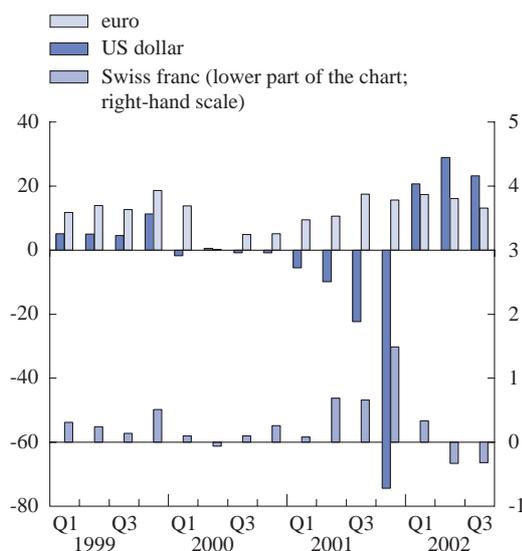
Evidence for the first nine months of 2002 suggests that in general euro-denominated deposits remained at the high levels recorded at the end of 2001. Only in some countries, mainly Croatia, Hungary and Poland, where the increase had been particularly significant in 2001, did the level of euro-denominated deposits decline somewhat. As there has also been no further significant growth in deposits (with only a few exceptions), the evidence suggests that there has been a one-time shift in demand from euro legacy currency to euro-denominated deposits associated with the cash changeover.

Balkans and Turkey increased strongly in 2001, particularly in the last quarter, in which, according to anecdotal evidence, the bulk of

the euro legacy banknotes was shipped back to the euro area from abroad.

Chart 8 Quarterly flows of major currencies in circulation

(in EUR billions¹⁾)



Source: BIS and ECB (seasonally adjusted figures for Swiss francs; ECB calculations).

1) Data on US dollars and Swiss francs are converted into euro using the average exchange rate in 2001.

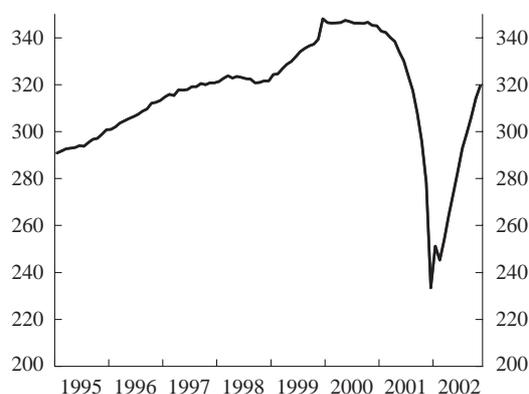
Finally, both non-euro area and euro area residents may have exchanged euro legacy banknotes for other major currencies' banknotes, such as the US dollar and the Swiss franc (see Chart 8). While there seems to have been some exchange for Swiss francs, the impact of this exchange on developments in euro area currency in circulation was small in 2001 and 2002, given the relatively low amount of Swiss francs in circulation. By contrast, the demand for the US dollar in 2001, but also in 2002, was clearly higher than the average demand over the period from 1995 to 2000. However, it is difficult to attribute this to euro cash changeover effects. For example, the situation in Latin America in 2001 and 2002 may have led to an increased demand for the US dollar outside the United States at this time, which probably had a more significant impact than any effects linked to the cash changeover. Taking both this and further anecdotal evidence into account, it is likely that the possible substitution of euro legacy banknotes for US dollar banknotes amounts, in euro billions, to a single-digit figure.

4 The impact of the euro cash changeover on the demand for currency

In the first eleven months of 2002, the growth of currency in circulation recovered steadily, by 40.9% on an annualised basis compared with December 2001. At the same time, in November 2002 a gap remained between the level of currency and the level observed at the end of 2000 (see Chart 9). However, given the pace of the recovery of currency demand, it is too early to answer the question

of whether the euro cash changeover has led to a structural shift in the demand for currency in the euro area.

Following the decline in currency hoarding in 2001, the recovery of the demand for currency in 2002 was, to a large extent, driven by the resumption of currency hoarding by both euro area residents and

Chart 9**Developments of currency in circulation in the euro area***(outstanding amounts in EUR billions; end-of-month figures)*

Source: ECB.

non-euro area residents. In particular, large-value euro banknotes increased strongly, as evidenced by the number of €500 banknotes in circulation, which nearly tripled between January and December 2002. While demand for the other large-value banknotes also increased significantly, that for low-value banknotes in circulation declined over the same period.¹⁰ As can be seen from Table 2, the average euro banknote value increased by more than 50% between end-January 2002 (€28) and end-December 2002 (€44).¹¹ Consequently, the end-December value was

21% above the average legacy banknote value in the euro area in December 2000.¹²

The average euro banknote value is now slightly above that of the Netherlands in December 2000, but still below that of Germany. In both countries, the denomination structure was very similar to that of the euro. In fact, in Germany and the Netherlands the average legacy banknote value at the end of 2000 was €49 and €43 respectively.

The rise in the average euro banknote value over the average legacy banknote value may indicate a structurally higher demand for euro currency based on the availability of large-value banknotes. This may also increase the incentives for economic agents to use currency for hoarding purposes in those countries in which such high denominations did not previously exist. At the same time, however, some of the currency hoarding in the informal economy which was “laundered”

¹⁰ The increase in December, as compared with November, is to a significant extent linked to seasonal effects.

¹¹ The rise in the average euro banknote value was also affected by the high amount of low-value euro banknotes put into circulation for precautionary and logistical reasons in the first weeks following the cash changeover.

¹² In such a comparison, the average euro banknote value is slightly upwards-biased, as the nearest equivalent of some euro legacy banknotes are euro coins.

Table 2**Euro banknotes in circulation in 2002***(figures in millions, value in EUR millions; non-seasonally adjusted figures)*

2002	EUR 500	EUR 200	EUR 100	EUR 50	EUR 20	EUR 10	EUR 5	Total (number)	Total (value)	average value per banknote in EUR
Jan.	61	75	364	1,417	1,962	2,000	1,922	7,800	221,489	28
Feb.	80	88	438	1,612	1,926	1,822	1,506	7,473	246,535	33
Mar.	93	95	477	1,780	1,910	1,742	1,302	7,398	264,150	36
Apr.	103	99	502	1,820	1,828	1,622	1,186	7,159	271,138	38
May	112	103	527	1,896	1,802	1,587	1,149	7,174	281,492	39
June	120	106	550	1,930	1,815	1,570	1,135	7,226	290,375	40
July	131	110	578	2,039	1,833	1,548	1,120	7,358	304,774	41
Aug.	134	110	583	2,068	1,814	1,518	1,110	7,336	307,710	42
Sep.	140	111	592	2,093	1,793	1,512	1,112	7,353	312,440	42
Oct.	147	113	606	2,143	1,802	1,523	1,115	7,448	320,875	43
Nov.	155	115	619	2,165	1,774	1,495	1,107	7,430	326,468	44
Dec.	167	121	673	2,435	1,975	1,643	1,191	8,204	358,535	44

Source: ECB.

as a result of direct substitution for interest bearing assets or indirect substitution (such as the purchase of luxury goods) may not be resumed.

In addition, there are currently no clear indications of a significant substitution of currency for credit and debit cards linked to the euro cash changeover. By contrast, the increased use of credit and debit cards reported in the first few days of January 2002¹³ appears to have been a rather temporary phenomenon.

The effects of the changeover on the demand for banknotes for cross-border transactions are not clear. On the one hand, the single currency may lead to lower currency holdings, as travellers within the euro area no longer need to hold several currencies, there is no longer a need for exchange booths to keep the 12 euro area legacy currencies, and the cross-border transaction costs for cashless payment instruments (such as payment cards) are lower. On the other hand, for instance, lower fees for cross-border cash withdrawals from automated teller machines (ATMs) could lead to an increase in the use of currency by travellers within the euro area. At the same time, however, lower fees for cross-border ATM transactions may also bring down the level of currency holdings, as the need to hold large amounts of currency has decreased.

The substitution of euro legacy currency banknotes for US dollars and Swiss francs by both euro area residents and non-euro area

residents seems to have been, to a large extent, a temporary phenomenon, as indicated by the weaker growth of currency in circulation in the United States and negative flows of currency in circulation in Switzerland in the second and third quarters of 2002 (see Chart 8).

With regard to foreign demand for the euro, following relatively little frontloading of euro banknotes – of around €5 billion only – to destinations outside the euro area in December 2001, net outflows of euro banknotes of around €27 billion were recorded in the balance of payments for the period up to October 2002; this suggests that most of the legacy banknotes held abroad had already been substituted for euro banknotes (see Box 3). Consequently, it would appear that euro banknotes are likely to assume the role previously played by Deutsche Mark banknotes in some of the central and eastern European countries, as well as in the western Balkans. In addition, the relatively weak development in euro-denominated deposits in several euro area neighbouring countries in 2002 suggests that the increase in asset substitution of euro legacy currency banknotes for euro-denominated deposits in 2001 was more of a one-off event, most probably promoted by attractive conditions for converting legacy banknotes into euro banknotes when opening a bank account. Finally, both the close trade ties between the euro area and its neighbouring countries and the EU accession process may further strengthen the demand for the euro in these countries.

5 Conclusions

The main determinants of the demand for currency in the euro area are transaction variables (e.g. private consumption) and components reflecting the opportunity cost of holding currency (e.g. short-term interest rates). Furthermore, currency developments also seem to depend on foreign demand for banknotes, which in turn depends on the relative stability of currencies in other

countries vis-à-vis the euro. Finally, factors such as taxation, the size of the informal economy, the rising use of cashless payment instruments, as well as some legal regulations promoting the use of cashless payments also play an important role in currency demand in the euro area.

¹³ See, for example, *Europay International News*, Issue 1, January 2002.

In the run-up to the cash changeover, primarily in 2001, currency holdings fell substantially, largely owing to a reduction in the amount of hoarded banknotes. The impact of this steep decline in currency holdings on euro area monetary aggregates was, however, limited, as it was largely compensated for by shifts in other components of these aggregates. In the first year following the euro cash changeover, currency holdings were replenished to a substantial degree, mainly as a result of the resumption of currency hoarding by both euro area residents and non-euro area residents. Nevertheless, in November 2002 the level of currency in circulation was still below that observed at the end of 2000.

Overall, it is too early, at the current juncture, to assess the long-term impact of the cash changeover. There are arguments to suggest that either a higher or a lower demand for euro currency could emerge over

a longer-term horizon. The availability of larger-value euro banknotes as compared with most of the euro legacy currencies may point to a continuing substantial or even increasing demand for the euro. In addition, the increasingly close ties between the euro area and its neighbouring countries may strengthen the demand for euro currency over the coming years. In addition, the euro may encourage increasing use of currency in the euro area owing to lower fees for cross-border cash withdrawals. Conversely, euro currency holdings may be lower as compared with euro legacy currency holdings on account of the fact that some currency holdings in the informal economy are likely to have been “laundered” prior to the cash changeover. Furthermore, lower cross-border transaction costs for cashless payment instruments, such as payment cards, and the existence of the euro instead of 12 national currencies may have a downward impact on currency demand.