Circulation of the Deutsche Mark – from currency reform to European monetary union

Among important dates in Germany's modern monetary history are 20 June 1948, 1 July 1990 and 1 January 2002. With the currency reform of 20 June 1948 the Deutsche Mark became the new and sole legal tender of West Germany. On 1 July 1990 the Deutsche Mark's status as legal tender was extended to the territory of East Germany, and 1 January 2002 saw the introduction of euro banknotes and coins and therefore the end of the Deutsche Mark's status as legal tender. At the end of February 2002 Deutsche Mark banknotes and coins vanished completely from payments. Over 53 years are spanned by these events, years in which the Deutsche Mark became an international symbol of stable money and economic prosperity. The present article retraces the development of the circulation of Deutsche Mark banknotes and coins and depicts half a century of German monetary history from the new beginning, the period of continuity and then the re-orientation and final metamorphosis into the euro. Historical experience of Deutsche Mark currency in circulation provides a source of knowledge for the present and future.

The 1948 currency reform

The necessity, ...

Following the end of the Second World War Germany's currency and economy were intatters. Surplus currency abounded.[1] Banks were over their heads in debt. The economy became increasingly paralysed since production and trading at the fixed Reichsmark prices had become unattractive. The black market boomed, and bartering proliferated. The public increasingly rejected the Reichsmark.

... preparation and ...

It was urgently necessary to reform the monetary system. In order to eliminate the surplus of money, the Allies chose to reform the currency by replacing the Reichsmark with the Deutsche Mark.[2] In preparation for this, a new central bank system was established in West Germany in the spring of 1948, consisting of independent Land Central Banks and the Bank deutscher Länder with headquarters in Frankfurt am Main.[3] The Deutsche Bundesbank became the legal successor of the Bank deutscher Länder in 1957. In April 1948 the Western allies convened the Conclave of Rothwesten to involve German experts in the organisation and technical implementation of the currency reform.

... implementation of the currency reform

Currency reform took effect on Sunday, 20 July 1948. The Issue Act (Emissionsgesetz) transferred to the Bank deutscher Länder the sole right to issue banknotes and, for the time being, also coins.[4] Section 1 of the Currency Act (Währungsgesetz) stipulated that "the Deutsche Mark currency is valid with effect from 21 June 1948."[5] The act contained provisions relating to the per capita amount (DM60, to be paid out in two instalments: the first of DM40 and the second of DM20), the business quota of DM60 per employee and the initial provision for public authorities.[6] Under the Conversion Act of 27 June 1948 private non-banks' credit balances were converted into Deutsche Mark at the rate of 10:1 (including per capita amounts and business quotas); half of this amount initially remained out of reach in a blocked account. Although the money stock was relatively small in terms of the national product, the adjustments in the price structure immediately led to major price increases which were fed by a very high velocity of the money in circulation.

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1 The volume of currency in circulation in the German Reich rose during the war alone from RM11 billion to RM73 billion.
2 As early as October 1947 the United States had decided to award a contract to print new banknotes to the American Bank Note Company. Printing was finished in March 1948. During 1947 coupons were printed for the Soviet Occupation Zone; following currency reform in the western half of the country, these coupons were quickly stuck on to Reichsmark notes in the Soviet Occupation Zone.
3 Before then France had already introduced the franc as legal tender in the Saar area. It was not until July 1959, two years after the Saarland had legally been incorporated into the Federal Republic of Germany, that the Deutsche Mark became legal tender in the Saarland. Meanwhile, in the Soviet Occupation Zone a *Deutsche Emissions- und Girobank* had been established on 21 May 1948. Following separate economic reforms in West Germany and the Soviet Occupation Zone, this bank was transformed into the *Deutsche Notenbank* on 20 July 1948 and into the *Staatsbank der DDR* in 1968.
4 The banknotes it issued were denominated in Deutsche Mark or pfennigs. In addition, the Bank deutscher Länder was temporarily authorised to issue banknotes not bearing its name (eg those printed in the United States). In mid-1950 the coinage prerogative reverted to the Federal Government.
5 No coverage or redemption requirements were envisaged for the Deutsche Mark, making it a purely paper currency from the very beginning. On 21 June 1948 the Reichsmark, the Rentenmark and the Allied military mark all became invalid.
6 The Länder and local authorities received Deutsche Mark amounts equal to one-sixth of their actual revenues during the period of October 1947 to March 1948. On 24 June 1948, one day after the announcement of the Soviet currency reform decree for the Soviet Occupation Zone and Greater Berlin, the Western powers decreed the introduction of the Deutsche Mark in West Berlin. On 20 March 1949 the Deutsche Mark became the sole legal tender in West Berlin. On 24 June 1948 the Soviet Occupation Zone began to issue a new currency which in July 1948 was named *Deutsche Mark der Deutschen Notenbank*. In 1964 it was renamed *Mark der Deutschen Notenbank*, becoming *Mark der Deutschen Demokratischen Republik* in 1968.

The military governments therefore decided at the beginning of October 1948 to cancel 70% of the funds in blocked accounts (Blocked Accounts Act of 4 October 1948). Consequently, the conversion ratio for substantial Reichsmark balances turned out to be merely 10 : 0.65. This meant that the currency reform had eliminated the monetary overhang. Absolutely no claims were granted over and above those Reichsmark-denominated balances converted into Deutsche Mark. This meant that the holders of financial assets, including many small-time savers, had practically been dispossessed. The worthless claims of banks on the Reich were also eliminated. As compensation, the banks received claims on the *Länder* and later on the Federal Government, thereby eliminating their excessive indebtedness, too. However, recurring liabilities (wages, rents, pensions etc) were converted at the rate of 1:1.

Sovereign creation of new money

The Reichsmark balances registered by individuals and enterprises other than banks and public institutions amounted to around RM145 billion. This was the basis for the sovereign creation of the new money, which resulted from the per capita amounts and business quotas and from the initial provisioning of public authorities and the occupying powers, and which totalled DM4.4 billion by the end of June 1948. All in all, the currency changeover led to the statutory creation of just over DM13 billion in 1948.

On the day of the currency reform Ludwig Erhard – despite the reservations of the Allies – announced that rationing would be considerably relaxed and price controls abolished. This instantly reestablished incentives for production, sales and earning money since money became scarce and therefore valuable and cherished. The currency and economic reform thus became a catalyst for the *Wirtschaftswunder,* or economic miracle.

Currency reform – a catalyst for the "Wirtschaftswunder"

In addition, the psychological effect of shop windows filling up with products overnight was a decisive factor in the development of the *Wirtschaftswunder* legend, which soon more than made up for the fact that the changeover had resembled expropriation. The Deutsche Mark enjoyed confidence from the very first day and was accepted by the public as a general medium of payment. It maintained this confidence to the very end. Although it did not fully escape currency crises and intermittent risks to its stability, it still proved to be more stable than all other major currencies, with an average annual inflation rate of 2¾%.

Denominations and pattern of Deutsche Mark currency in circulation

Over more than five decades the Deutsche Mark saw little change in the denomination of coins and notes in circulation. There were no changes at all between 1952 and 1964; later, some higher-value denominations were introduced. In 1948 DM5, DM10, DM20, DM50 and DM100 banknotes that were printed in the United States were issued. In addition, banknotes with a face value of DM2 and DM1 and 50 pfennigs were put into circulation. Banknotes not bearing "Bank deutscher Länder" were gradually replaced with notes issued by the Bank deutscher Länder.[7] The first few banknotes issued by the Bank deutscher Länder had a face value of 5 pfennigs and 10 pfennigs.

Issue of coins

As the technology of the day did not allow new small-value tokens to be manufactured in time for currency reform, all Reichsmark notes and coins up to RM1 continued to be legal tender at one-tenth of their face value in Deutsche Mark, so as to ensure a sufficient supply of small change. At the beginning of 1949 new 1-pfennig coins, and later new 10-pfennig coins, were issued. By the end of 1950 coins of 2, 5 and 50 pfennigs and DM1 had become available. The first DM2 coins were issued in May 1951, and silver DM5 coins in May 1952.[8] These coin denominations were maintained until the Deutsche Mark's final days. The only newcomers were DM10 commemorative coins of which only limited quantities were minted and which were hardly used in payments. As early as 1953 the Bank deutscher Länder introduced the first DM5 commemorative coin.[9] Owing to their large face values, commemorative coins accounted for around 25% of the value of coins in circulation at the end of 2000. Under the Act on the Minting of Coins of July 1950[10] the right to issue coins, ie the coinage prerogative, rested with the Federal Government, and the Bundesbank put coins into circulation on its behalf. However, to prevent seignorage (the difference between the face value and the cost of manufacturing coins, which went to the Federal Government) conflicting with the Bundesbank's monetary policy tasks, the Bundesbank's approval was needed to mint coins if minting exceeded DM20 per capita. This amount was already exceeded by the 1950s; at the end of 2000 the amount of coins in circulation amounted to DM147 per capita.[11]

Banknotes in circulation initially restricted

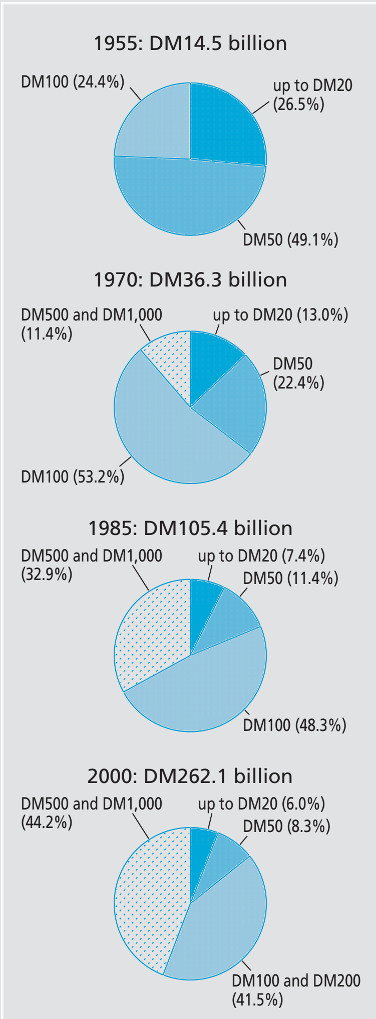
The Issue Act of 1948 limited banknotes in circulation to DM10 billion. This limit was gradually raised to DM16 billion between 1953 and 1956. By that time the currency had already demonstrated that it did not need such confidence-boosting support. The Bundesbank Act of 26 July 1957 removed all limits to banknotes in circulation;[12] in return, the Bundesbank's monetary policy powers were adjusted to make it easier to manage the entire volume of money. The Deutsche Mark-denominated banknotes became the sole unrestricted legal tender in Germany and had to be accepted in all amounts by creditors as redemption for monetary debts.[13]

7 Pursuant to section 3 (4) of the Issue Act, banknotes not bearing the name "Bank deutscher Länder" would have had to be recalled not later than 31 December 1952. However, a November 1952 amendment to the act made this unnecessary.
8 Owing to the sharp rise in the price of silver the Bundesbank began to withdraw these coins in 1975 and to replace them with cupro-nickel coins, bringing a thousand-year-old tradition of silver coins in Germany to an end. Since then only commemorative coins have contained silver.
9 DM5 commemorative coins were issued until 1986, DM10 coins initially from 1970 to 1972 (to commemorate the Munich Olympics) and then from 1986 to the end of 2001. Between 0.2 million and 8.85 million coins per motif were minted. In addition, proof commemorative coins were minted (with up to 1 million minted per issue). These coins were worth more than their face value and were not been included in the coins in circulation. The same is true of the DM1 gold coin issued by the Bundesbank in 2001.
10 Superseded by the new Coin Act on 1 January 2002.
11 The coinage prerogative continues to lie with the member states in monetary union (Article 106 (2) of the EC Treaty). The amount of coins issued in the individual countries is subject to approval by the ECB.
12 Sections 3, 14, 36 and 37 of the Bundesbank Act form the legal basis for the Bundesbank's responsibility for banknotes in circulation.
13 Coins, however, were only limited legal tender. Under the 1950 Coin Act a creditor did not have to accept more than DM20 in Deutsche Mark coins or more than DM5 in pfennig coins. Since January 2002 up to 50 euro coins per payment must be accepted.

The Bundesbank's banknote series

Following its establishment in 1957 the Bundesbank initially left the banknotes issued by the Bank deutscher Länder in circulation. It was not until February 1961 that they were gradually replaced by a new series of notes. The last of the banknotes issued by the Bank deutscher Länder were recalled on 31 July 1966. The new series added to existing denominations a DM1,000 note in 1964 and a DM500 note in 1965. In a departure from the uniform format of the banknote series of the Bank deutscher Länder, the banknotes in this series had different sizes for each denomination to avoid confusion and guard against counterfeiting. It was not until nearly 30 years later that the Bundesbank began to issue a new series of notes between October 1990 and October 1992. The reason was primarily to improve protection against counterfeits, a move necessitated by advances in copying technology. Accordingly, the new notes were equipped with a number of internationally accepted features to protect them against counterfeiting, making them among the world's best-protected banknotes. In addition, account needed to be taken of the increasingly computerised nature of cash transactions. In 1990 the first-ever DM200 banknote was introduced. The Bundesbank hoped that introducing this banknote would lead to a reduction in the number of DM100 banknotes and thus to a reduction in costs to banks and the Bundesbank. What actually transpired, though, is that demand for the DM200 banknote did not meet expectations. The banknotes from the previous series were recalled on 30 June 1995.[14] The last series of banknotes to be issued ceased to be legal tender once euro banknotes were introduced at the beginning of 2002. However, all Deutsche Mark banknotes issued since 1948 have retained their value; they have been exchanged by the Bundesbank indefinitely and free of charge at their face value or, since the beginning of 2002, for euro at the irrevocable conversion rate.

Pattern of banknotes in circulation



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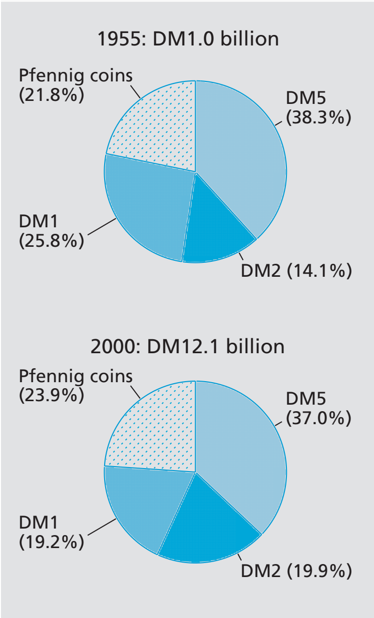
14 Coins issued by the Bank deutscher Länder and the Federal Government, however, remained legal tender until the introduction of euro coins.

Pattern of coins in circulation*



* Excluding commemorative coins.

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Pattern of banknotes in circulation

The make-up of banknotes in circulation has changed considerably since the currency reform. The percentage of smaller denominations up to DM20 has been going down steadily. Until 1960 the DM50 banknote accounted for the largest share of banknotes in circulation, in terms of value, followed by the DM100 banknote. This shift in importance was based on wage and price increases and the lengthening of wage payment and wage settlement periods, until cashless payments started to proliferate in the mid-sixties. As late as the early 1980s the DM100 note accounted for half of all banknotes in circulation. The importance of the larger denominations, especially the DM1,000 banknote, initially rose quite steadily. However, since the late 1970s their percentage rose in large increments, reaching over 44% by the end of 2000. This development reflects several factors: the general rise in the nominal value of cash payments, suspected growth of activity in the shadow economy and, most importantly, the major role played by large-denomination notes as stores of value. The pattern of currency in circulation – excluding commemorative coins – has changed relatively little, by contrast.

Longer-term developments and determinants of currency in circulation

Erratic development of currency ratio

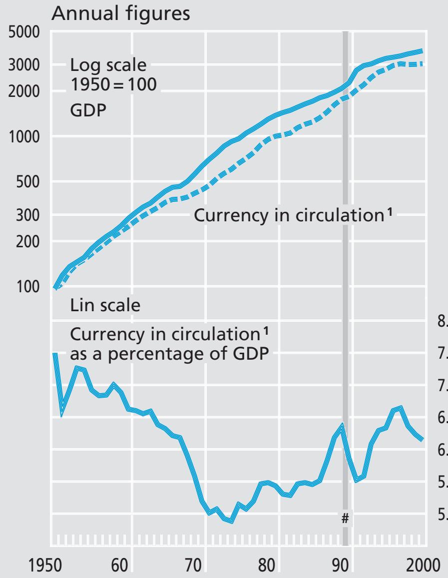
By the time sovereign money creation ended in 1948, the volume of currency in circulation had already returned to normal. After that, it grew almost uninterruptedly in line with nominal GDP growth until the late 1990s. Between 1950 and 2000 the volume of currency in circulation outside the banking system increased by an average of DM7.8 billion annually to DM244.8 billion, or around 32-fold. During the same period the national product – taking into account the enlargement of the territory of the Federal Republic of Germany in 1990 – grew (in nominal terms) around 38-fold. The currency ratio, ie the ratio of currency in circulation to GDP, therefore declined slightly over the entire period. The development of the currency ratio, however, was quite erratic. After virtually stagnating in the 1950s, it went down almost continually until the early 1970s, reflecting, in particular, the increasing spread of cashless payments. Factors contributing to this development included the introduction of giro accounts for the general public, cashless wage and salary payment, innovations in cashless payments and the growth of credit institutions' branch networks during that time frame. Declining currency ratios were a typical feature of most industrial countries at that time, with this development being more pronounced in some countries than in Germany (examples being France, the Netherlands and the United Kingdom) or, in isolated cases, occurring much later (Italy). From the mid-seventies these factors in Germany which were reducing the demand for cash in relative terms appeared to have expired or superseded by other factors. Until the mid-eighties, the currency ratio rose slightly, albeit with fluctuations, and then rose sharply until the late 1990s. Since 1997 the currency ratio has been back on the decline. Differences in the opportunity costs of holding cash, changes in the external value of the Deutsche Mark and, at times, taxation played a key role. Finally, the increase in the circulation of Deutsche Mark abroad following radical political change in eastern and south-eastern Europe was a considerably important factor. By contrast, the innovations in payments since the 1970s have had relatively little impact on the demand for cash in Germany.[15]

Opportunity costs of holding cash

Money market interest rates and therefore the opportunity costs of holding cash fluctuated violently at times during the 1970s and 1980s, leaving a distinct mark on the movements of currency. Currency in circulation weakened considerably in the wake of the tight-money policy following the first and second oil-price shocks and in 1989 but resumed its strong growth during the easy-money periods that followed each monetary tightening. In the 1990s the opportunity

Currency in circulation and GDP

Annual figures



1 Not including credit institutions' cash balances. — # From the second half of 1990 the territory of the Federal Republic of Germany as now defined.

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costs of holding cash, by contrast, apparently only played a minor role in the growth in currency.

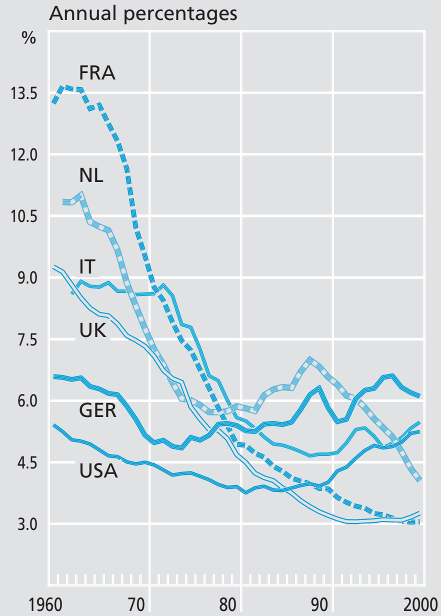
Significance of the external value of the Deutsche Mark

From the early 1970s the development of the external value of the Deutsche Mark, which fluctuated wildly in response to the dollar rate following the flotation of exchange rates in

15 The lack of statistics on Deutsche Mark cash balances and cash payments in Germany and abroad as well as numerous institutional changes have made it difficult to make an econometrical analysis of the factors determining the demand for Deutsche Mark over the entire period since 1948. A sparingly parameterised specification of the demand for cash – using a transaction variable and a short-term interest rate as explanatory variables – is not capable of satisfactorily mapping structural breaks, determinants having merely a temporary effect and special influences on the demand for Deutsche Marks in Germany and abroad. Studies by the Bundesbank also suggest that the estimated elasticity of income, even when demand for cash is simply defined, is subject to relatively sharp fluctuations which are probably attributable to the explanatory variables not taken into account.

Cash holdings as a percentage of GDP*

Annual percentages



* Not including credit institutions' cash balances.

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1973, also contributed to the volatility of the currency ratio. Against that background Deutsche Mark banknotes became an attractive alternative store of value for non-residents, even if the Deutsche Mark was subject to strong exchange-rate expectations. The accelerated growth in cash from 1977 to 1978, 1985 to 1987 and 1994 to 1995 were linked to an appreciation of the Deutsche Mark, and isolated phases of declining growth such as those between 1979 and 1981 or 1996 and 1998 were accompanied by a weakening of the Deutsche Mark's external value.

Tax policy factors

From 1987 to 1993 currency in circulation was influenced greatly by the debate and decisions on taxation. In the period between the announcement in October 1987 of the withholding tax on interest income from monetary assets and the repeal of this tax in April 1989 the pace of currency expansion more than doubled. A period of virtual stagnation followed before cash growth accelerated on the heels of the Federal Constitutional Court's decision on the taxation of investment income in June 1991 and reached unprecedented growth rates by the end of 1992, ie immediately prior to the introduction of the Act on the Tax of Interest Income in 1993. These developments indicated, for one thing, an increase in the hoarding of cash by domestic non-banks at the expense of interest-bearing financial assets.[16] For another, they indicated that German investors deposited monetary capital in cash with banks in countries where tax laws were more favourable. It is true that the Deutsche Mark banknotes additionally required for those purposes quickly found their way back to the Bundesbank since most of this cash flowed into Germany's immediate neighbours (Austria, Switzerland and Luxembourg). However, this did temporarily raise the volume of currency in circulation. Cash growth slowed down after 1986 as the wealth tax was abolished with effect from 1997. What is striking is that the fluctuations in the growth of cash caused by interest rates, the Deutsche Mark's external value and tax policy primarily influenced changes in the demand for DM500 and DM1,000 banknotes.

German monetary union

German reunification in 1990 resulted in a further jump in the amount of currency is-

16 In 1988 savings deposits at statutory notice were increased more sharply than longer-term bank liabilities. One reason may have been that they were not subject to the withholding tax introduced in 1989.

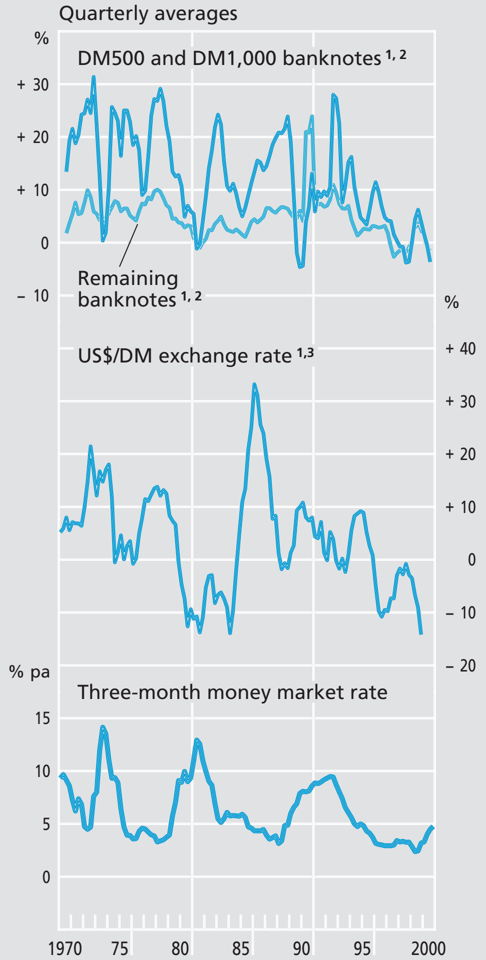
sued by the Bundesbank. When the Treaty between the Federal Republic of Germany and the German Democratic Republic Establishing a Monetary, Economic and Social Union entered into force, the Deutsche Mark became the sole legal tender in the German Democratic Republic on 1 July 1990, ie even before political unification, and responsibility for monetary and foreign exchange policy was transferred to the Bundesbank. All assets, in principle, were exchanged at the rate of 2:1.[17] Although the conversion rate was rather high compared with the official rates used in the past, it seemed justifiable particularly because the inflationary monetary overhang in the German Democratic Republic, unlike that of other central and east European countries, was apparently relatively small. Flow variables such as wages and salaries were converted at the rate of 1:1.

Surge in money stock

The entire process of converting East German marks into Deutsche Mark was carried out through the accounts of banks in the German Democratic Republic; no cash was exchanged. Cash denominated in marks of the German Democratic Republic was to be deposited in a bank account by 6 July 1990; Deutsche Mark cash was paid out beginning on Sunday, 1 July. While the Bundesbank provided the necessary Deutsche Mark banknotes from its reserves, the mints were unable to meet all of the demand for coins, which meant that pfennig coins of the German Democratic Republic remained legal tender until 1 July 1991. At the end of 1989 16.7 billion marks were in circulation in the German Democratic Republic. The volume of Deutsche Marks in circulation in Germany as now de-

Banknotes in circulation, the US$/DM exchange rate and money market rate

Quarterly averages



1 Annualised quarterly changes. — 2 Three-period moving average. — 3 Eight-period moving average.

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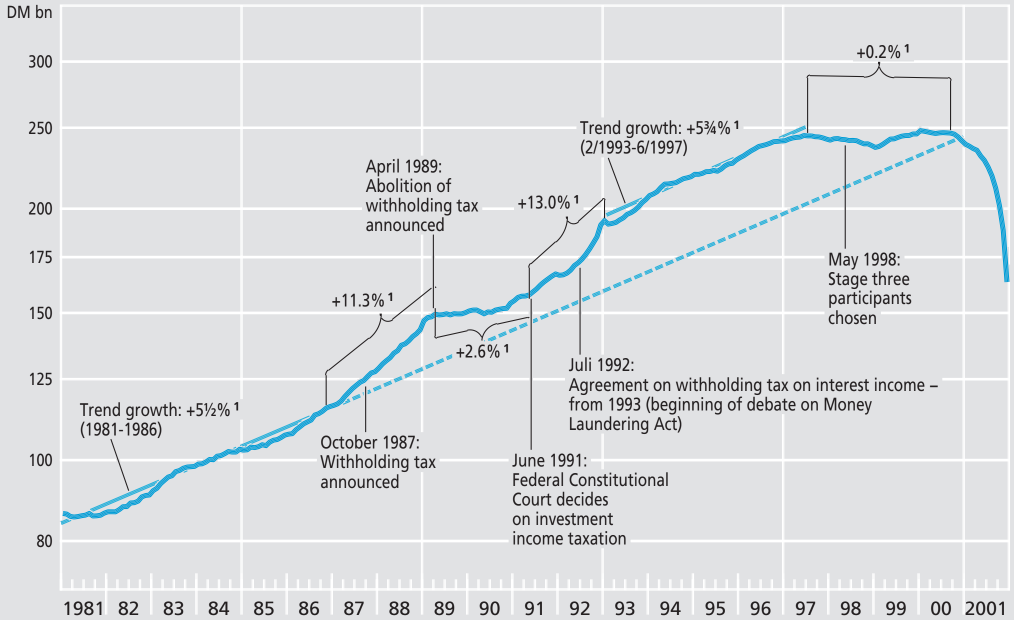
17 However, a social component was taken into account regarding savings deposits. Depending on the age of the former East German citizens whose assets were eligible for conversion, either 2,000 marks, 4,000 marks or 6,000 marks per capita were exchanged at the rate of 1:1. See also Deutsche Bundesbank, Terms of the currency conversion in the German Democratic Republic on 1 July 1990, *Monthly Report,* June 1990; Deutsche Bundesbank, The monetary union with the German Democratic Republic, *Monthly Report,* July 1990; Deutsche Bundesbank, Technical and organisational aspects of the monetary union with the German Democratic Republic, *Monthly Report,* October 1990.

Deutsche Mark currency in circulation*

Monthly averages, seasonally adjusted, log scale



* Excluding credit institutions' cash balances and adjusted for statistical breaks (such as the 1990 German monetary union). — **1** Calculated as an annual rate.

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fined (excluding credit institutions' cash balances) went up by DM8½ billion, or just under 6%, during July 1990.[18] The monetary union did not subsequently exert any particular influence on overall monetary growth.

Foreign demand for Deutsche Mark

By the 1970s, if not earlier, the Deutsche Mark had acquired all the features commonly associated with an international currency. This was also reflected by the trend increase in Deutsche Marks held abroad. Deutsche Marks left the country as a result of the increase in foreign travel; in addition, foreign workers who were living in Germany and whose numbers were steadily rising transferred Deutsche Marks to their home countries. Last but not least, cash also served as a cross-border capital investment vehicle. Since some of the Deutsche Mark banknotes taken abroad either were hoarded or served as a circulating currency, Deutsche Mark balances abroad apparently continued to grow well into the second half of the 1990s. However, the decisive factor was the political and economic opening of eastern Europe beginning in the late 1980s and the continuing crisis in the former Yugoslavia, in the course of which the domestic currency weakened visibly. In those countries the Deutsche Mark acquired the status of a substitute currency. This was due not only to Germany's geographical vicinity to the former Socialist countries but also, and more importantly, to the massive confidence in the stability which the Deutsche

18 In July 1990, as a consequence of the monetary union and the statutorily fixed conversion rate, new Deutsche Mark cash balances as defined by M3 were created which amounted to approximately 15% of the western German M3 – a veritable surge in the money stock.

Mark had earned in the marketplace of currencies and which enabled it to obtain widespread worldwide acceptance.

Estimated volume of Deutsche Mark circulating abroad

There is no way of statistically recording the amount of Deutsche Mark circulating abroad. Information is available on outflows and return flows of banknotes via German credit institutions, as these data are included in balance-of-payments statistics. However, these flow variables form just one element of all cross-border banknote transactions and at the very most can serve as an indicator of changes in the Deutsche Mark balances held abroad.[19] As there are no direct methods of recording Deutsche Mark circulating abroad which promise any success, a study by the Bundesbank resorted to indirect methods.[20] The study found that at the end of 1994 between 30% and 40% of all Deutsche Mark could have been held abroad. However, foreign demand for Deutsche Mark probably slackened noticeably from 1997. Between 1997 and mid-2000 overall currency in circulation remained more or less stagnant. In 1999 it increased temporarily, probably owing to the turmoil in south-eastern Europe (the Kosovo conflict) and the discussion of the year 2000 problem.[21] Some east European countries demonstrated impressive initial success in stabilisation. The progress in replacing government regulations with market mechanisms inhibited black marketeering, which requires large amounts of cash; the transition to convertible currencies at realistic exchange rates reduced demand for foreign currency; and deposits bore increasingly attractive rates of interest. Owing to the stagnating economy in the former Yugoslavia, there were no signs of further export-related imports of Deutsche Mark. Net amounts of banknotes returning from foreign countries rose.

Innovations in payments

In the past few decades, innovations in cashless payments have caused cash balances to grow more slowly than consumption or GDP in many countries. Germany's currency ratio, however, has risen since the 1970s, and that of the United States since the 1980s. In those two countries cashless payments have been on the rise with a corresponding decrease in cash balances; foreign demand for the Deutsche Mark and the US dollar, however, has prevented those developments from having an impact on the currency ratio. In addition, the advent of cashless payments in Germany has occurred with little fanfare; cash has continued to be popular as an "inexpensive" and effective payment instrument.[22] The credit transfer and direct debit are two traditional cashless payment instruments in Germany. The next important step following the introduction of cashless wage and salary

19 In particular, it has been shown that, in addition to domestic currency, Deutsche Mark banknotes have assumed a role as a medium of payment and store of value in some countries during times of economic difficulties. Whenever there have been strong inflationary trends, real interest rates have been negative and devaluation has been expected, outflows of banknotes to those states have increased and return flows decreased.
20 F Seitz, The circulation of Deutsche Mark abroad, Economic Research Group of the Deutsche Bundesbank, Discussion paper 1/95, April 1995.
21 However, neither the United Nations' declaration of the Deutsche Mark as the official currency of Kosovo in September 1999 nor the introduction of the Deutsche Mark as legal tender in Montenegro in November 1999 had any measurable impact on the demand for Deutsche Mark cash. The Deutsche Mark cash required in those regions was already in circulation.
22 See also Deutsche Bundesbank, Monetary policy and payment systems, *Monthly Report,* March 1997; Recent developments in electronic money, *Monthly Report,* June 1999.

payments in the 1960s was the introduction of the eurocheque in the early 1970s. The number of cheque cards in Germany rose from around 5 million in 1972 to 52 million in 2001.[23] They were joined by various card-based payment methods.[24] Despite their initially rapid growth, credit cards have remained relatively insignificant. Since the early 1990s debit cards (eurocheque cards and bank cards with a PIN number) have been playing an increasingly important role in cashless payments. Bank cards seem to be crowding out the credit card and the cheque (of which the guarantee function in conjunction with eurocheque cards expired at the beginning of 2002) since they represent a relatively cost-effective alternative for both retailers and customers alike. Innovations in payments are "cannibalistic" in the sense that they crowd out not only cash but also already existing cashless payment instruments. This means that, although card-based payments have risen sharply in Germany in the past few years, they still make up a relatively small percentage of cashless payments in Germany (just over 5%) compared to other European countries (the EU average is just under 21%). The spread and use of electronic money on *GeldKarten* or on chip cards has been extremely muted. Ultimately, cashless payment media have only a limited ability to duplicate the special features of cash.

The introduction of euro cash

Decline in currency in circulation from 1997

The growth of cash began to recede in mid-1997. The average volume of currency in circulation in 1998 was smaller than in the previous year for the first time in the Deutsche Mark's history. Although there is no one single cause for this unusual development, the slowdown in demand for Deutsche Mark banknotes in the eastern and south-eastern European transition countries and uncertainty in the run-up to European monetary union may have played a role. The receding trend in currency in circulation was interrupted in 1999 in connection with the Y2K changeover but resumed as the date of the issuance of euro cash came closer and closer. Beginning in the second half of 2000 the (seasonally adjusted) demand for Deutsche Mark steadily decreased, and this process gained speed from the late summer of 2001. In the euro area as a whole, currency in circulation did not begin to decline until the spring of 2001. From the late summer currency in circulation went down in all euro-area countries. The pace of reduction in cash was much more rapid in Germany than in the euro area as a whole, with the key factor being the particularly sharp reduction in large-denomination Deutsche Mark banknotes. Since the second half of 2001 an increasing number of Deutsche Mark banknotes have been returning from abroad, too. At the end of 2001 German currency in circulation, at a mere DM162.2 billion (€82.9 billion), was already more than 40% lower than its previous year's

23 In 1980 the first automated teller machines were introduced in Germany. Their proliferation is unlikely to have had a profound impact on cash balances. Although the fast and simple access to cash they afford promotes the use of cash, these machines also make it easier to hold smaller amounts of cash.
24 From 1960 to 1999 the volume of cashless payments rose from DM1.3 trillion to around DM74 trillion (excluding interbank payments).

level. This decline made it easier in terms of logistics to handle the currency changeover.

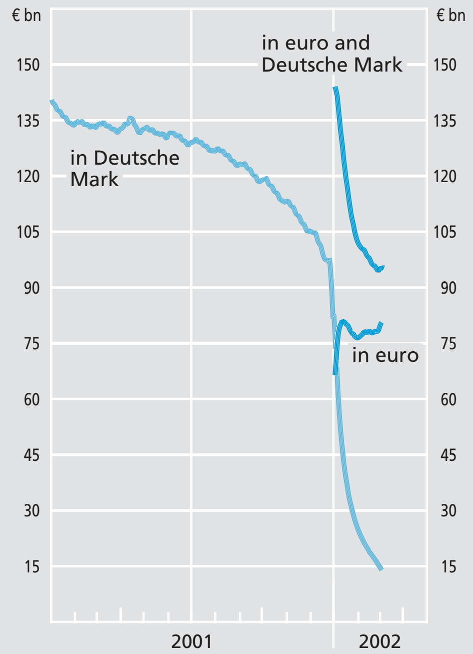
Preparing the changeover to euro cash

Years of comprehensive preparations were necessary to ensure that the issue of euro cash would go smoothly. The framework set by the European Union and the ECB left it up to each participating country to establish its own changeover scenario to suit its specific situation and needs. Production of the new banknotes and coins began in 1999. At the same time, a comprehensive information campaign on the introduction of the euro was launched, covering not just the euro area but also countries beyond the euro area's borders, especially those where the Deutsche Mark was used as a substitute currency. The early return of Deutsche Mark cash was also promoted in advertisements with the idea of "decongesting" the changeover process. From September 2001 to the end of the year German credit institutions were "frontloaded", ie supplied in advance, with €61 billion worth of euro cash, which they were then able to pass on, or "sub-frontload", to their counterparties in the euro area and, from December, to those outside the euro area. Moreover, the Bundesbank provided a little over €3 billion worth of cash in advance to non-euro-area central banks and non-euro-area credit institutions active in international foreign currency trading. From 17 December "starter kits" of euro coins were sold to the public, of which the Bundesbank provided 53.5 million worth a total of nearly €550 million.

The end of the Deutsche Mark

The introduction of euro cash at the beginning of 2002 marked the completion of the

Currency in circulation in Germany since 2001



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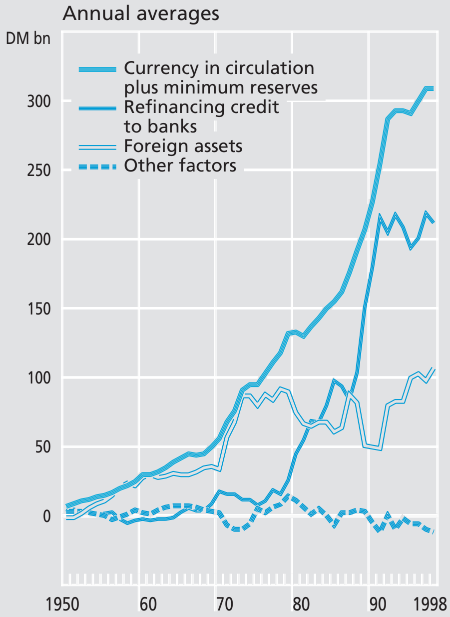
European monetary union project. Deutsche Mark notes and coins lost their status as legal tender, yet the banking industry, retailers and other cash-handling agents undertook to continue accepting Deutsche Mark cash until 28 February 2002 to cushion the impact of the changeover to euro cash. However, the Bundesbank will continue to exchange Deutsche Mark banknotes and German federal coins for euro indefinitely. The situation was completely different from the 1948 currency reform or the replacement of the mark of the German Democratic Republic. This time there was no change in the real value of the cash being exchanged. It was only a conversion into euro or exchange of cash at the fixed reference rate which had been in force from the beginning of monetary union in 1999. On the whole, the currency change-

Formation and use of central bank money in the Bundesbank's returns from 1950 bis 1998

Annual averages



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over went off without a hitch and was widely accepted by the general public. The DM162.2 billion (€82.9 billion) of cash still in circulation at the end of 2001 had shrivelled to DM50.4 billion (€25.8 billion) by the end of January 2002, going down even further to DM30.6 billion (€15.7 billion) by the end of February. At the same time, the amount of euro in circulation rose to €80.0 billion. At the end of February, however, the total amount of banknotes in circulation in Germany was still 30% below its previous year's level, and in the euro area as a whole it was down 19%. It remains to be seen whether the currency changeover will cause the currency ratio to remain permanently low or whether cash balances will go back up to near their previous levels.

Cash, monetary policy and central bank profits

Banknotes in circulation enable enforcement of monetary policy

The creation of money by credit institutions is generally associated with an increased need for central bank money, ie the sum of banknotes in circulation and minimum reserves which are required to be held at the central bank. Monetary policy therefore depends on the central bank's monopoly on the issue of banknotes and the creation of central bank money. The Bundesbank was at all times able to set the terms of the money market to suit its objectives – but only as long as commercial banks needed to refinance themselves at the Bundesbank in order to obtain central bank money. The banking system did not become dependent on refinancing until the Bretton Woods system broke down in March 1973. Until the early 1970s it was not the central bank's refinancing credit which was the source of bank liquidity but instead compulsory purchases of foreign exchange. It was only when the obligation to purchase US dollars and thus generate liquidity had been abolished that the Bundesbank took the initiative in creating central bank money. Since then the enormous rise in overall refinancing credit given by the Bundesbank until 1998 was largely due to the strong growth in the demand for cash. The relatively large volume of Deutsche Mark banknotes in circulation played a decisive role in the euro-area commercial banking sector's liquidity deficit vis-à-vis the Eurosystem continuing even after the beginning of stage three of European monetary union in 1999. For the foreseeable future, too, the demand for cash will probably ensure that the European banking system will be dependent on a sufficient degree of refinancing. Other preconditions for being able to enforce monetary policy at all times already exist in the Eurosystem: for instance, there is no obligation to intervene on foreign-exchange markets, nor is the central bank allowed to lend to the public sector.

Seigniorage

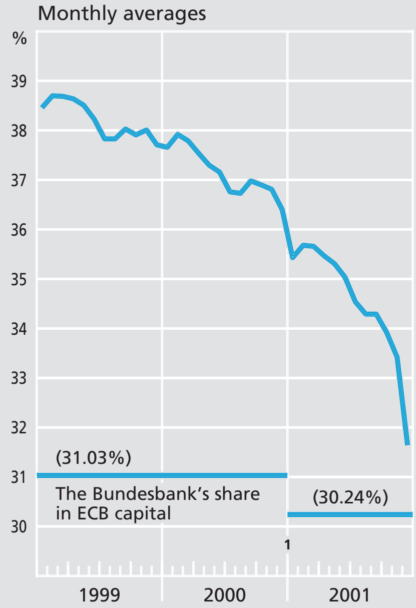
A central bank's profit greatly depends on the volume of banknotes in circulation. Because it has a monopoly on the issuing of banknotes, the central bank earns a profit from the creation of money. This seigniorage, as it is called, is the difference on the central bank's balance sheet between interest-bearing assets and the non-interest-bearing liabilities it incurs in issuing banknotes.[25] The Bundesbank's profits are based largely on its refinancing credit to the banking system and its interest-bearing foreign reserve assets. The main items on the liabilities side of the balance sheet are expenditure on personnel and administration, banknote printing, transfers to provisions for pensions and risks, interest payments on credit institutions' minimum reserve requirements (since 1999) and depreciations. Depreciations on foreign reserve assets, in particular, absorbed most or all of profits in the years up until 1979. Since 1980 the Bundesbank has continuously run a profit, sometimes a fairly large one, in its annual accounts and has transferred this profit to the Federal Government, which owns the Bundesbank. This is a reflection of the strong growth and large volume of Deutsche Mark banknotes in circulation, in particular.

Allocation of monetary income in the Eurosystem

Under the ESCB/ECB Statute the monetary income earned by national central banks from their assets, which they hold as balance-sheet

Deutsche Mark banknotes as a percentage of the currency in circulation in the Eurosystem

Monthly averages



1 Greece's accession to monetary union.

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counterparts to banknotes in circulation and credit institutions' deposits, is pooled and allocated to individual central banks in accordance with their percentage share in the ECB's capital. The pooling of monetary income is justified by the fact that such income is determined not nationally but by the Eurosystem's single monetary policy. Since euro-denominated central bank money can be used across national borders within the euro area, there is no longer a link between the country of origin and the country of use. The demand for euro banknotes in non-euro-area countries is generally satisfied by the Eurosystem, too. The allocation key for seignior-

25 In addition, until the beginning of stage three of European monetary union in 1999 the Bundesbank did not pay any interest on the central bank money it created as minimum reserves held by credit institutions, either.

age reflects each country's economic weight and is used to approximate the actual demand for central bank money in each country. This method of allocation has generally been applied from 2002, ie only since the issue of euro banknotes. Monetary income for the years 1999 to 2001 from currency in circulation, which in those years was still denominated exclusively in national currency, was retained by each respective national central bank. As the national shares in the overall volume of banknotes in circulation in the Eurosystem differ sharply from the capital key, the post-2002 earnings situation of individual national central banks differs sharply from the pre-2002 situation. For instance, the Bundesbank's average share of currency in circulation in the Eurosystem was just under 37% in the period from 1999 to 2001, yet its percentage share of the capital key is only 30%. As part of a transitional agreement for the years between 2002 and 2007 a gradual adjustment to the new method of allocating profit is therefore being implemented, which in the medium term will considerably dampen the impact of the new method on individual central banks' profitability.