

Money \neq wealth

- Suppose the European Central Bank gives you €1 million. Your wealth has apparently increased.
- But what if you had received this money 50 years ago? Would your euros be wealth then?
- Money is not wealth, but, at most and except for currency collectors, a claim on wealth: money is an instrument to acquire wealth (goods) but not wealth itself (what if you were on a desert island?).
- The purchasing power of an amount of money is the amount of goods that can be obtained from it.

Fallacy of composition

- If you receive €1 million, your purchasing power (ability to obtain wealth) increases. If everyone in Spain receives €1 million, is Spain wealthier?
- The fallacy of composition holds that what is true at a certain scale (the individual level) need not be true at a larger scale (the group, or economy, level).
- A seller reducing prices may sell more products. But if every seller reduces prices, it is not true that all of them would sell more products. If everybody leaves home earlier to avoid a traffic jam, the jam is no avoided but merely brought forward.

Banking crises, bubbles & the fallacy /1

- Banks extend loans with assets as collateral. If the borrower cannot service the loan, the bank seizes the asset (this occurs, for instance, with mortgages).
- Suppose that loans are mainly used to finance the purchase of real estate. If many banks engage in that lending, the prices of real estate will tend to rise. The expectation of higher prices may attract more real estate investors.
- More investors lead to a higher demand for loans, probably at a higher interest. The banks would be happy to grant collateralizing loans since the value of the collateral (real estate) is booming.

Banking crises, bubbles & the fallacy /2

- As the entry of new investors slows down, the value of real state tends to fall. This damages the last round of investors. When they fail to repay the loans, the banks' lending becomes more prudent.
- The credit contraction reduces the value of real state further. More default occurs. Banks turn risk adverse to lending. More bankruptcies follow. When banks finally seize the collateral, it is a depreciating asset that risks the banks' solvency.
- The fallacy: when banks engaged in collateralization, each presumed that it does not affect the price of the collateral asset. This is false in the aggregate.

Can too much money be harmful?

- For wealth, it appears that the more, the better. Does the same apply to money?
- Intuition: if the amount of wealth grows at a rate smaller than the amount of money, in proportion, more money corresponds to each unit of goods.
- This means that the money price of goods rise. By how much? There can be no limit, as hyperinflation testify: in a hyperinflation, the inflation rate is out of control (prices may change every minute).

100 trillion ZWD = 5 USD



<http://stephenlaughlin.posterous.com/buy-an-100-trillion-zimbabwe-dollar-bank-note>

http://en.wikipedia.org/wiki/Zimbabwean_dollar

<http://online.wsj.com/news/articles/SB10001424052748703730804576314953091790360>

Largest denomination banknote



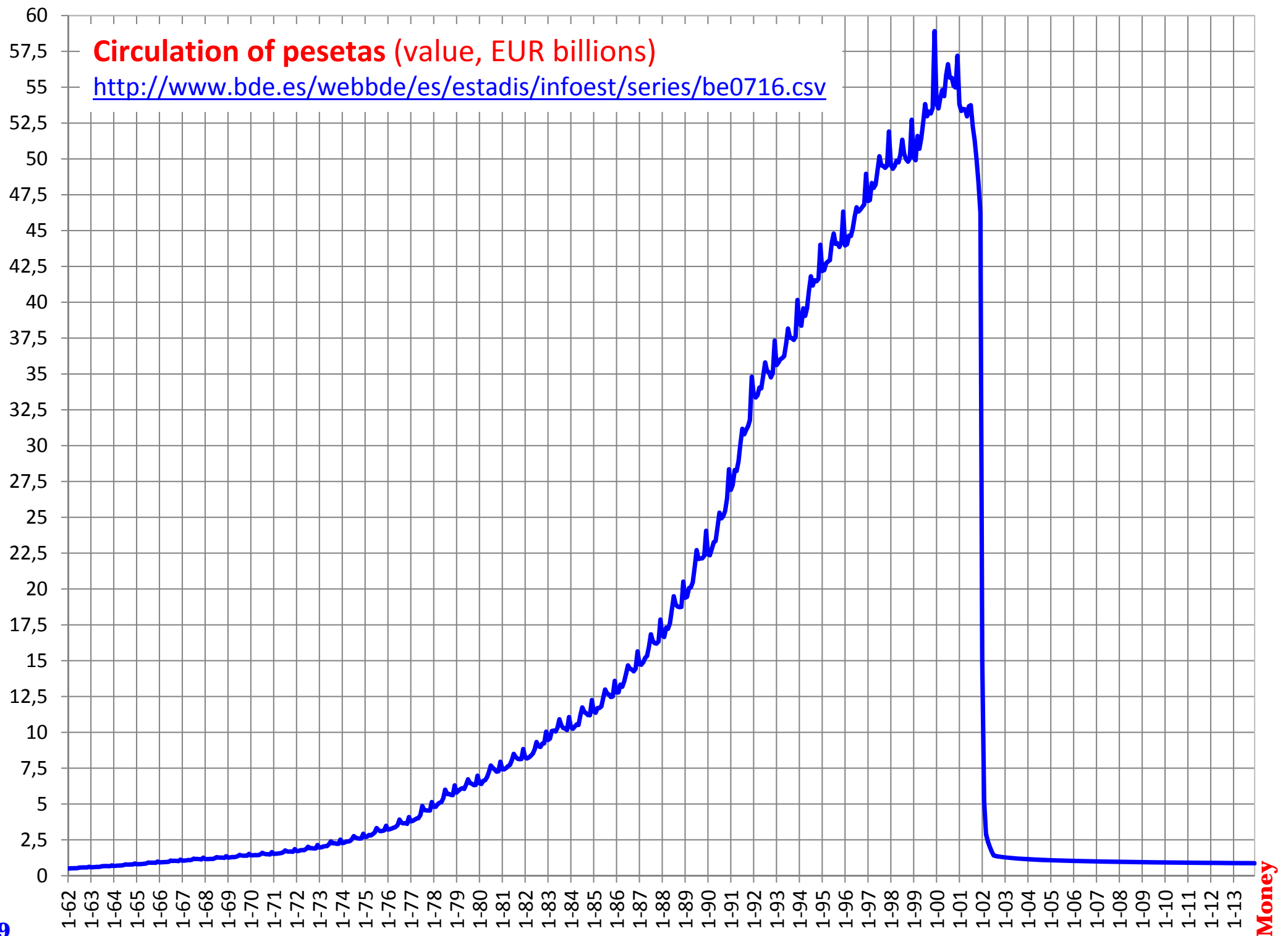
Hungary 1946 · 100 quintillion (= 10^{20}) pengő

<http://en.wikipedia.org/wiki/Hyperinflation>

http://www.zimbabwesituation.com/nov14_2008.html#Z2

Money as a sign of poverty

- Large denomination banknotes (the fuel that feeds the flames of hyperinflations) are actually a sign of poverty not wealth. In Hungary, 1946, prices doubled every 15.6 hours (monthly inflation reached 12,950,000,000,000,000 per cent).
- The 100 trillion ZWD banknote at some point in 2009 could just buy a bus ticket. It circulated a few months, until the ZWD was abandoned as legal currency in April 2009. In May 2011, the note was worth some 5 USD: it had become a commodity (wealth) for currency collectors and tourists.



Traditional account of money

- Money is everything considered money: money is as money does. It is recognized by three functions.
- Medium of exchange. Goods can be generally obtained in exchange for money, that is, money must can be used to make purchases of goods.
- Store of value. Money has the ability to preserve (at least part) of its purchasing power in time: it is a way of accumulating purchasing power.
- Unit of account. The value of goods is expressed in terms of money (the euro from 1999 to 2002).

Is there a most important function?

- Neoclassical economists tend to emphasize the medium of exchange function. Money is a “veil” under which the “true” economy (real sector) operates. Money just facilitates the exchange of goods.
- Postkeynesians put the emphasis on money as store of value. The ability to store wealth lies behind the existence and persistence of the unequal distribution of wealth.
- Historical evidence points to money as quantified reminders of debts, so money served as mere unit of account (D. Graeber (2011): *Debt. The first 5,000 years*).

The textbook myth /1

- Textbooks typically explain the story of the progression from barter to currency (gold and silver coinage) to credit. The historical evidence suggests that things have occurred the other way round.
- Records from Ancient Egypt and Mesopotamia (ca. 3,500 BC) show that the development of a credit system preceded the invention of coinage.
- In Ancient Mesopotamia, prices and debts (rents, fees, loans) were calculated in silver but had not be paid in silver. Peasants settled their debts mostly in barley and most transactions were based on credit.

The textbook myth /2

- So “virtual money” was first. Coins came much later, but were unable to completely replace credit systems.
- Barter is a kind of accidental byproduct of the use of coinage or paper money.
- Most of the cases of barter that are known, involve people are familiar with the use of money but, for one reason or another, have no access to currency (shortage of USD in Argentina, 2002, or rubles in Russia, in the 1990s).

The credit theory of money

- Holds that money is not a commodity (a “thing”) but an accounting tool. Money is a yardstick that measures debt (the same thing as credit). Coins and banknotes are a promise to pay something (see 15).
- Popular traditional perception: money derived its value from the precious metals of which the coins were made.
- Credit theory: a sale and purchase is the exchange of a commodity for credit, so the value of credit or money does not depend on the value of any metal or metals, but on the right to get the credit satisfied.



http://commons.wikimedia.org/wiki/File:Spain-franco_bank_notes_0009.jpg

The commodity theory of money

- Holds that money is a commodity whose role is to make trade easier. The point is to find the most convenient commodity to perform that function: one that is durable, easily recognized, divisible, easy to transport... The choice eventually narrowed down to the metals (<http://mises.org/daily/6122/>)
- As with any other commodity, an “excessive” amount of money tends to lower its value. More money should be given for goods, so the prices of goods are pushed up. The policy recommendation is to limit the amount of money in circulation.

Fiat money / fiat currency (notes)

- Money could be defined as anything generally accepted as a payment (in exchange) for goods. But money is accepted for goods because of the belief that it will be subsequently accepted for goods.
- The popular view identifies money with currency (= “physical money” = coins & banknotes), which what is typically used to buy goods. In the past, currency had intrinsic value (were pieces of metal).
- Currency is now fiat money: intrinsically worthless pieces of paper or metal. More generally, “money” is *“legal tender fiat currency originated by a central bank, the printed version of which is ‘cash’”*.

Modern monetary theory

- “Also known as neochartalism, [it] is a descriptive economic theory that details the procedures and consequences of using government-issued tokens as the unit of money, i.e., fiat money”.
- “MMT aims to describe and analyze modern economies in which the national currency is fiat money, established and created exclusively by the government. In MMT, money enters circulation through government spending. Taxation and its Legal Tender power to discharge debt establish the fiat money as currency”.

http://en.wikipedia.org/wiki/Modern_Monetary_Theory

Our currency: the euro

- The euro (sign: €; code: EUR) is the official currency of the 18 members of the eurozone (officially called euro area): A, B, C, E, FI, FR, GE, GR, IR, IT, LA, LU, M, N, P, SLA, SLE, and SP.
- The euro was born in Jan. 1999 as a unit of account and became currency on 1 Jan. 2002. It is managed by the Eurosystem: the European Central Bank plus the central banks of the eurozone members.
- It is the second most traded currency in the world, after the USD. By mid-2010, it surpassed the USD as the currency with highest value in circulation.

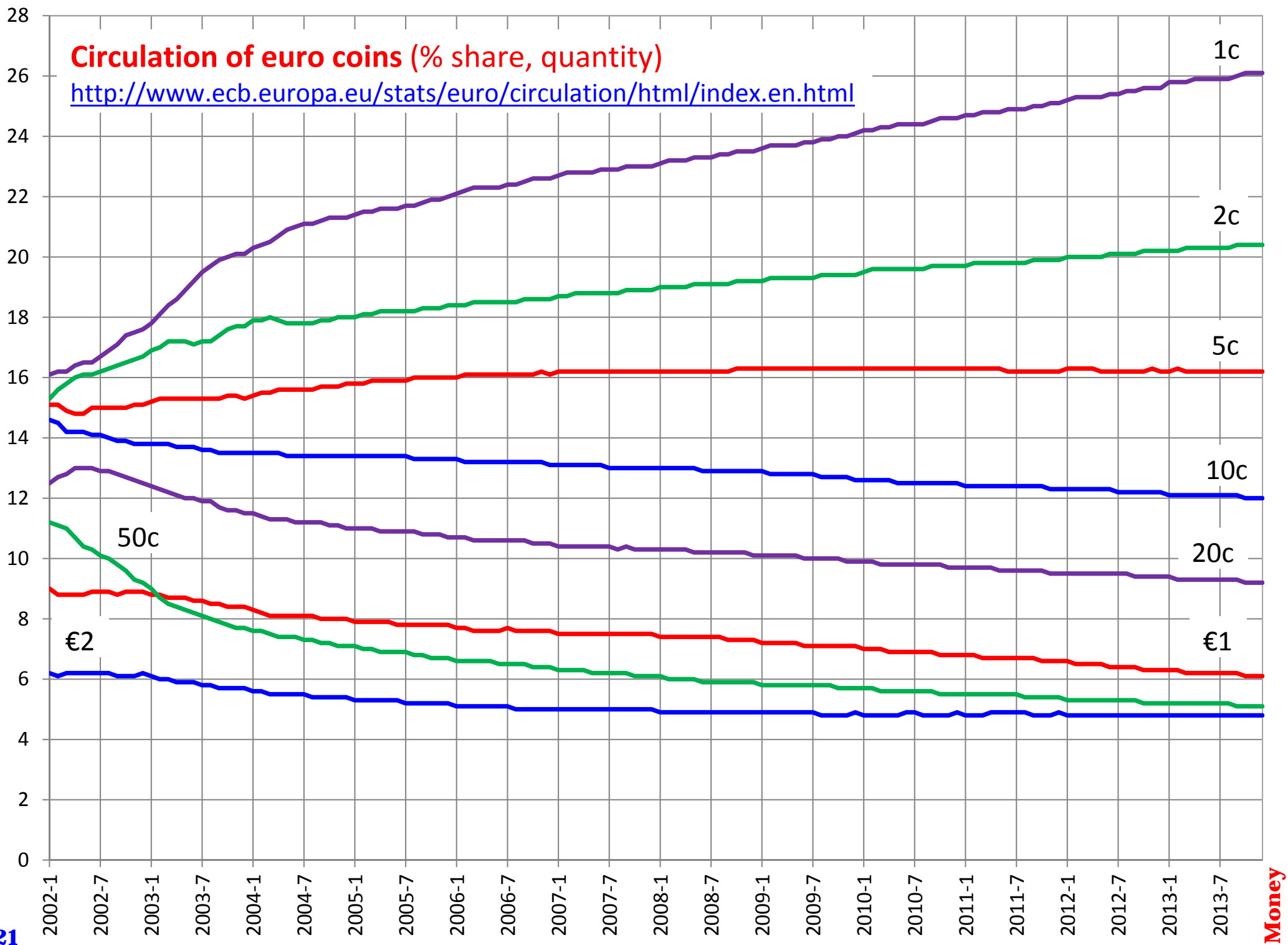
The Eurozone

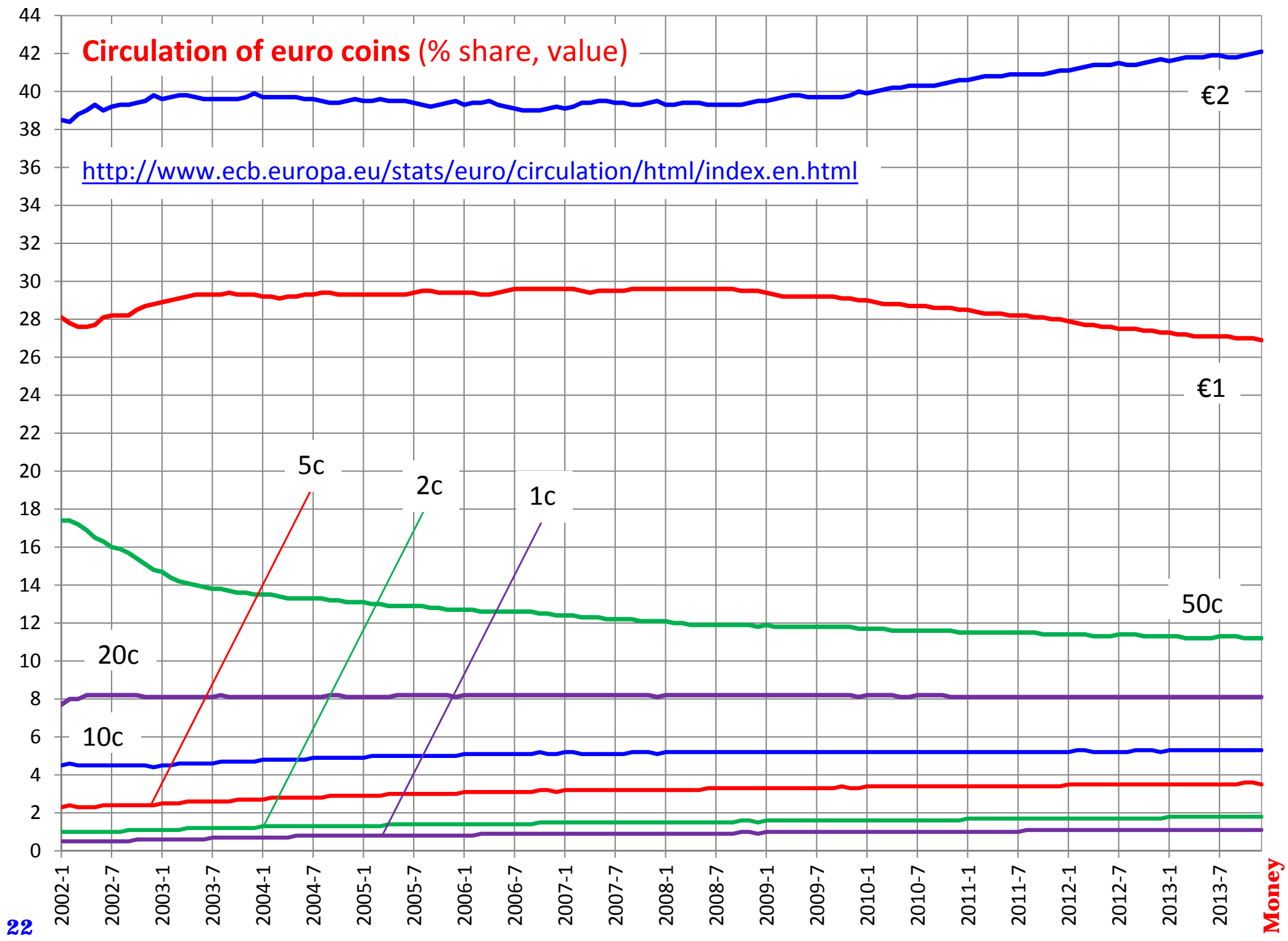
as from 1 Jan 2014



Circulation of euro coins (% share, quantity)

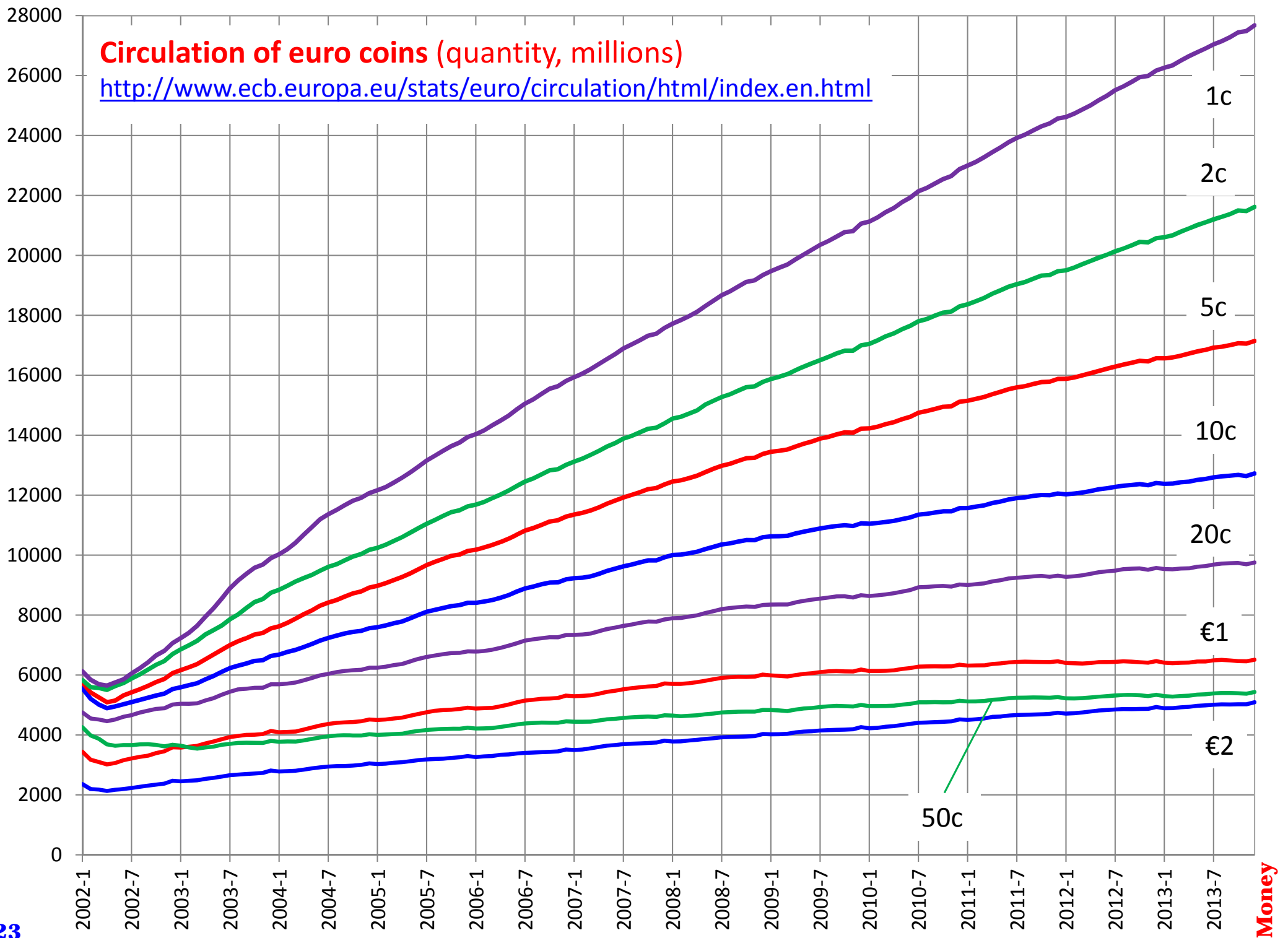
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Circulation of euro coins (quantity, millions)

<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.html>

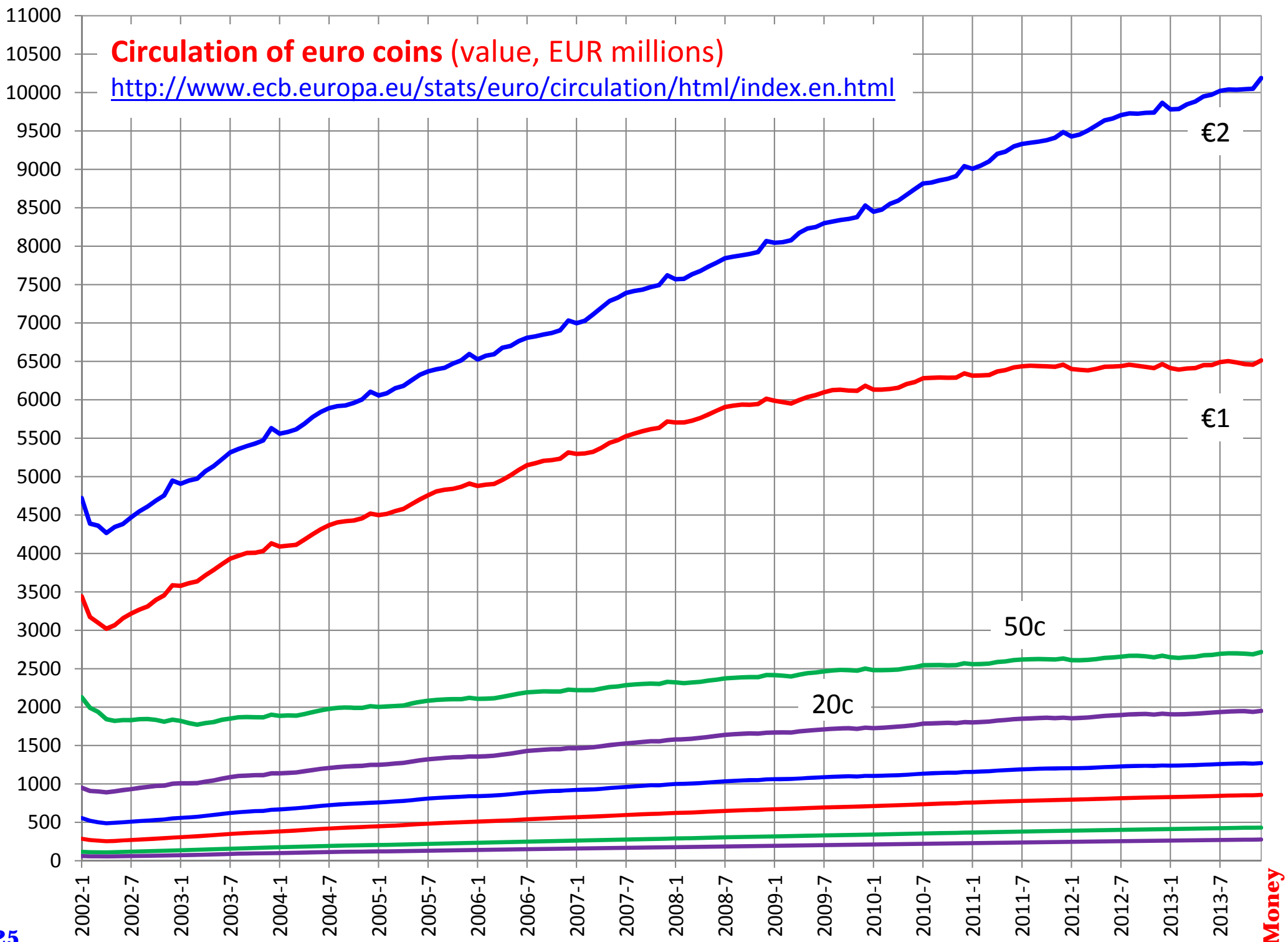


Circulation of euro coins

<i>Low denomi- nation coins</i>	<i>Quantity (millions)</i>	<i>High denomi- nation coins</i>	<i>Quantity (millions)</i>
1 CENT	27,675 26.1%	20 CENT	9,756 9.2%
2 CENT	21,620 20.4%	50 CENT	5,432 5.1%
5 CENT	17,144 16.2%	1 EUR	6,513 6.1%
10 CENT	12,724 12%	2 EUR	5,094 4.8%

Eurozone (changing composition) · Dec 2013

<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.htm>

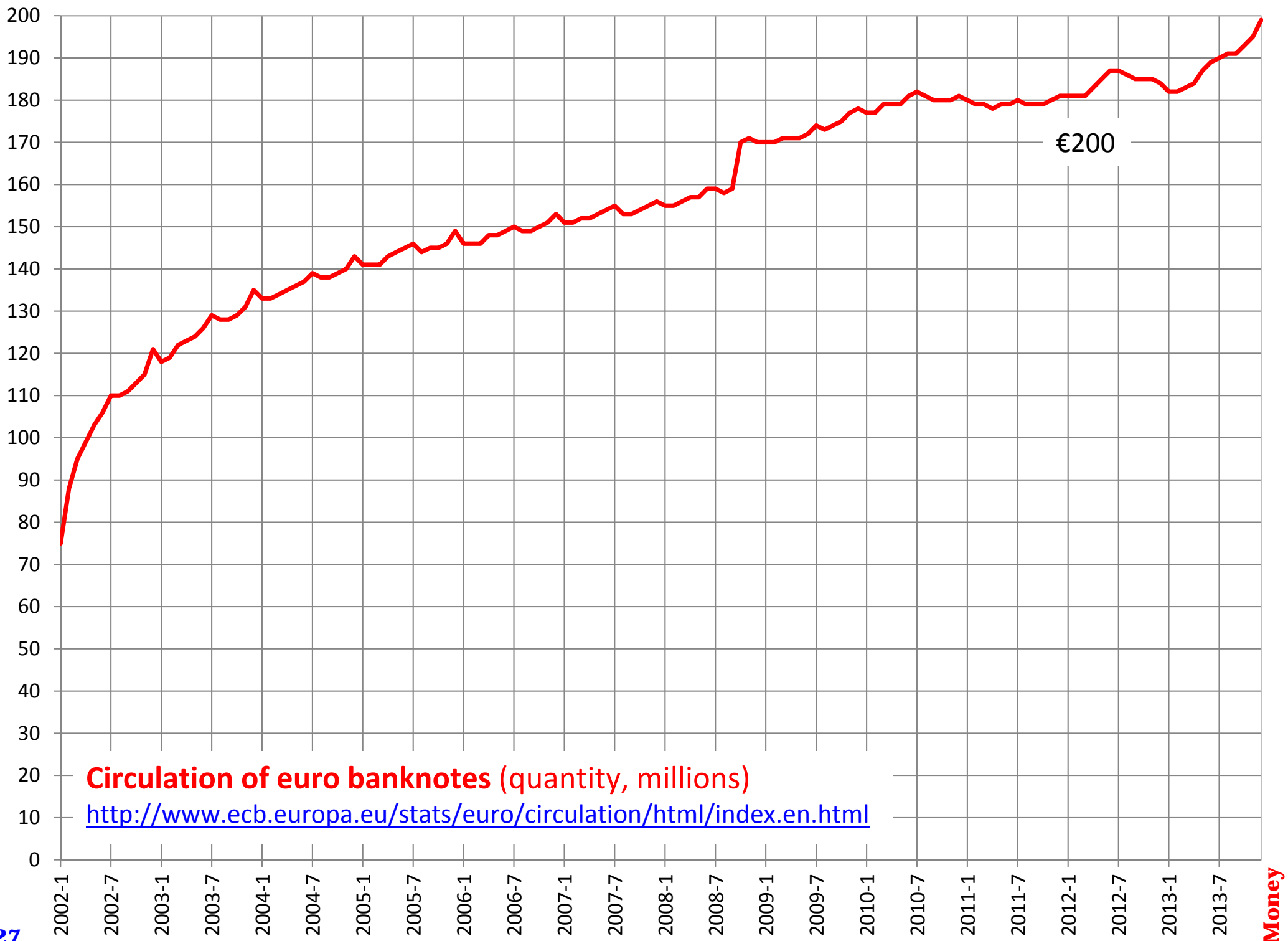


Circulation of euro coins

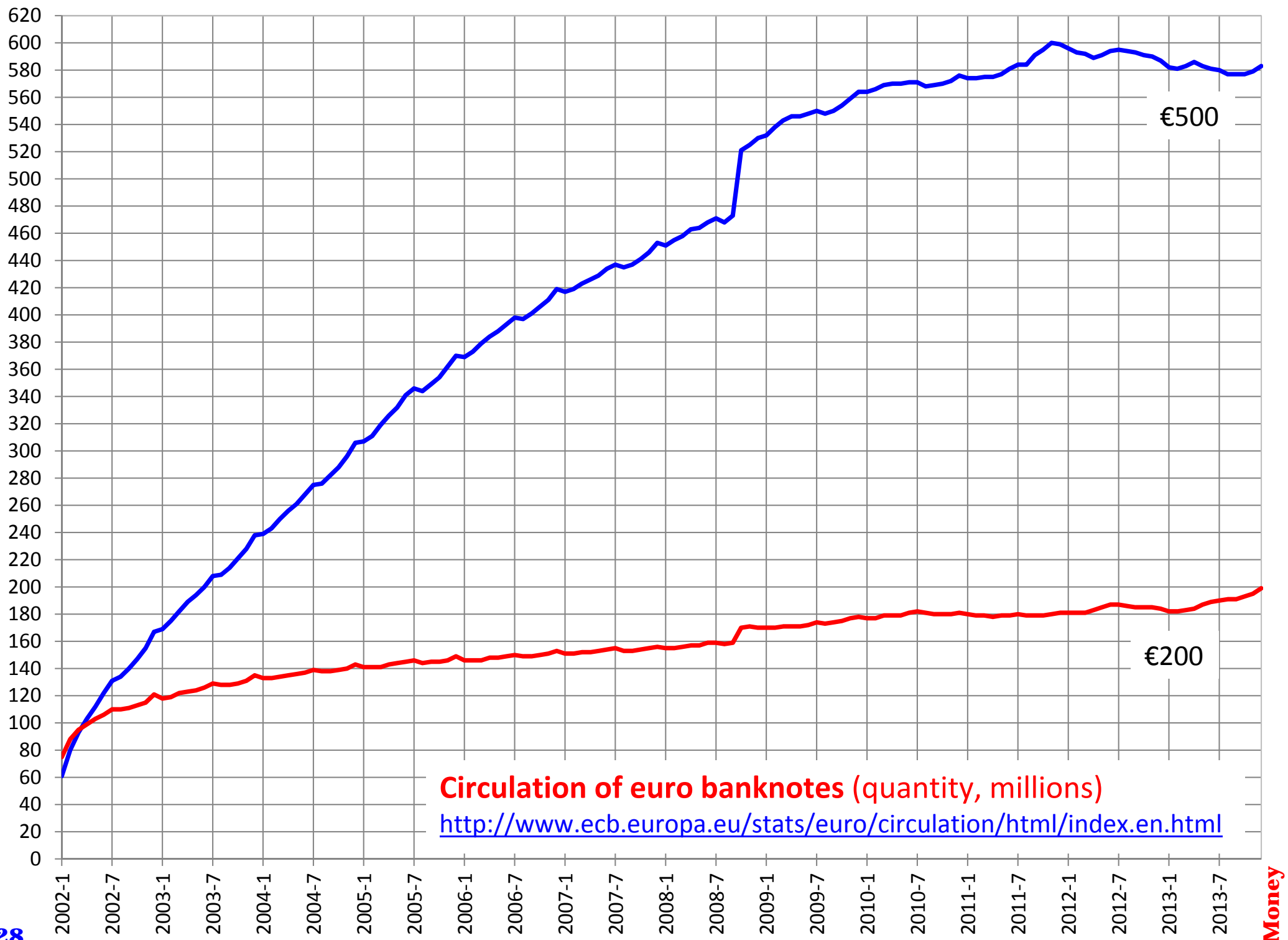
<i>Low denomi- nation coins</i>	<i>Value (EUR millions)</i>	<i>High denomi- nation coins</i>	<i>Value (EUR millions)</i>
1 CENT	277 1.1%	20 CENT	1,951 8.1%
2 CENT	432 1.8%	50 CENT	2,716 11.2%
5 CENT	857 3.5%	1 EUR	6,513 26.9%
10 CENT	1,272 5.3%	2 EUR	10,189 42.1%

Eurozone (changing composition) · Dec 2013

<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.htm>

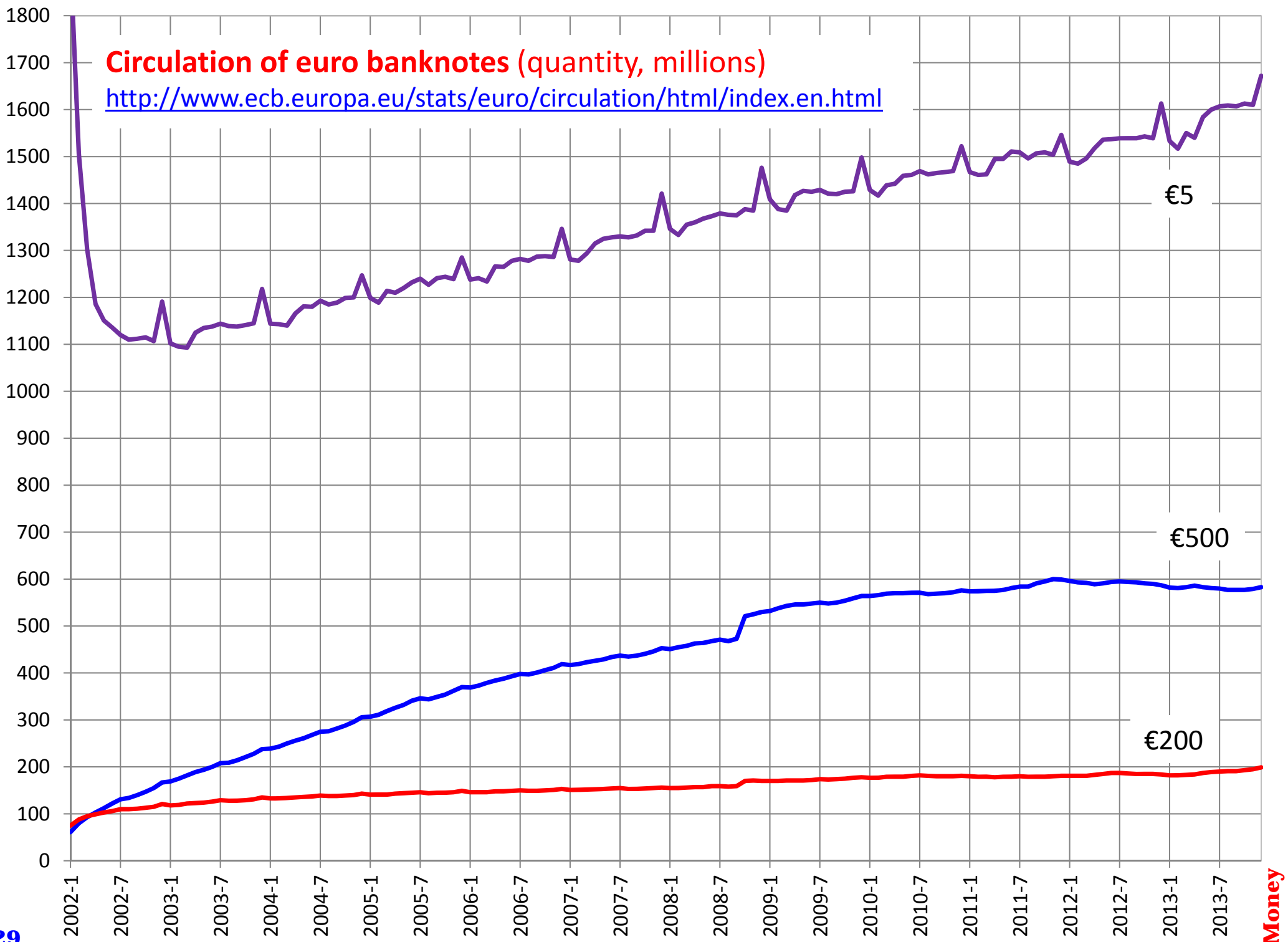


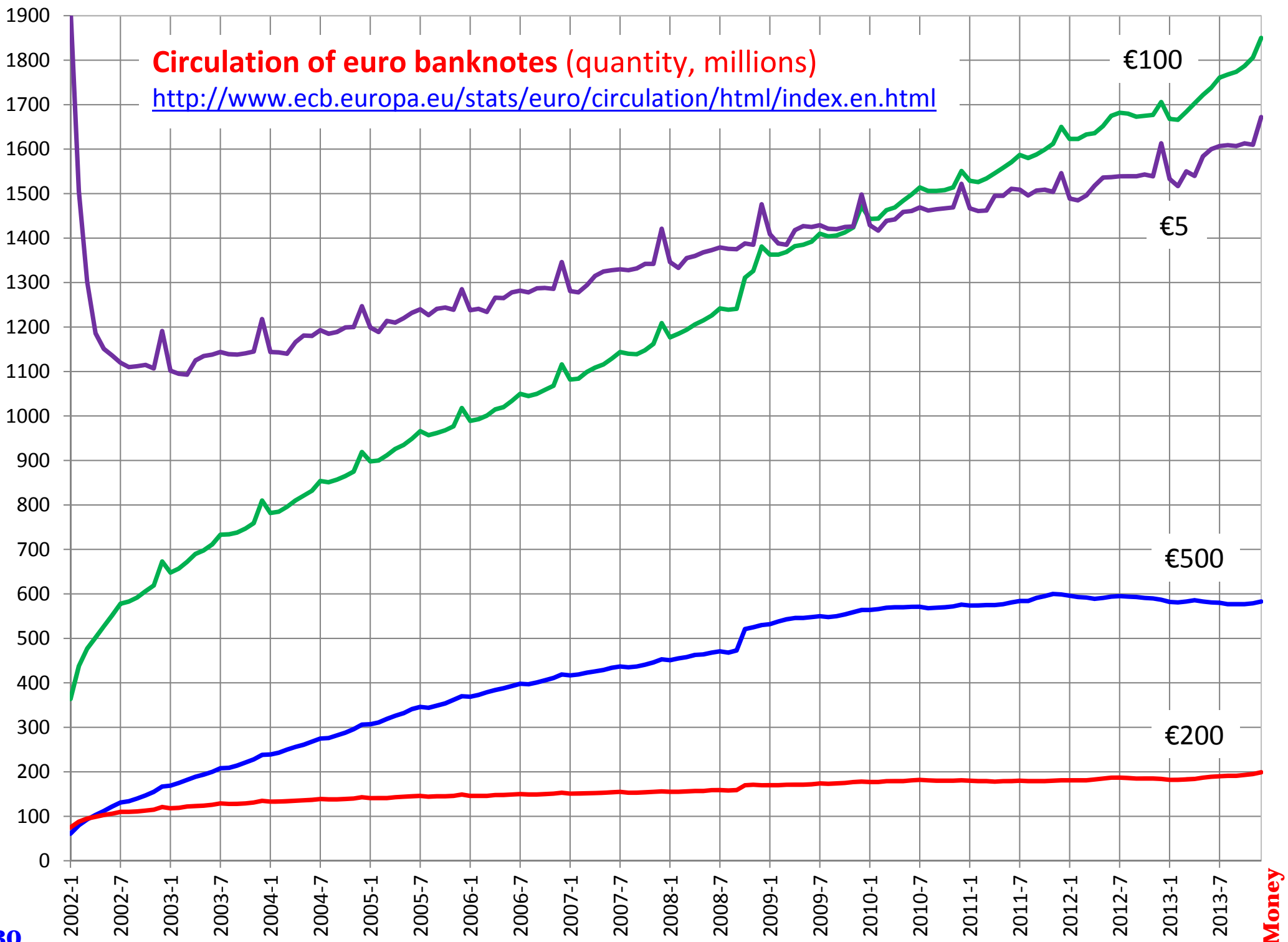
Circulation of euro banknotes (quantity, millions)
<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.html>

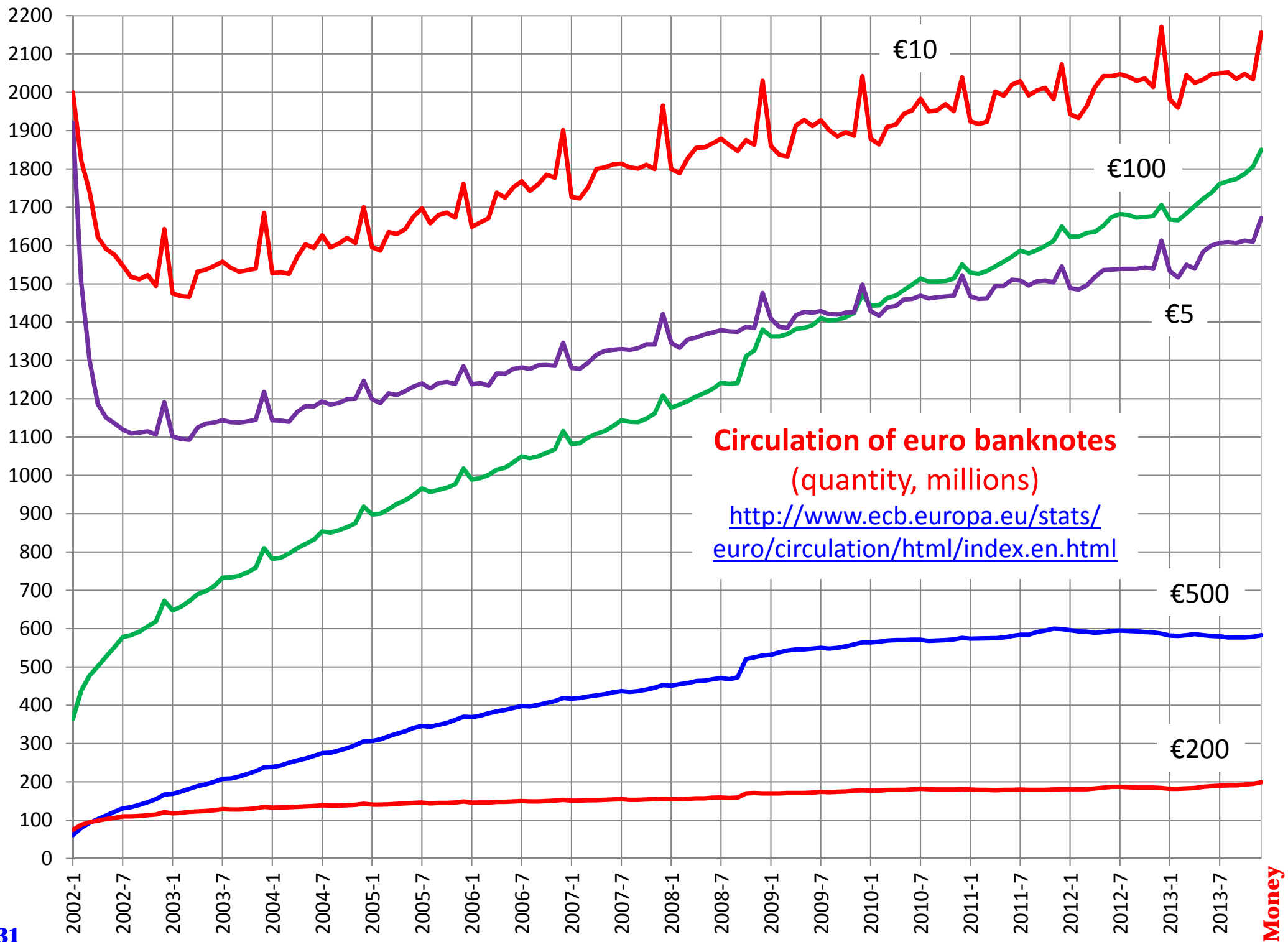


Circulation of euro banknotes (quantity, millions)

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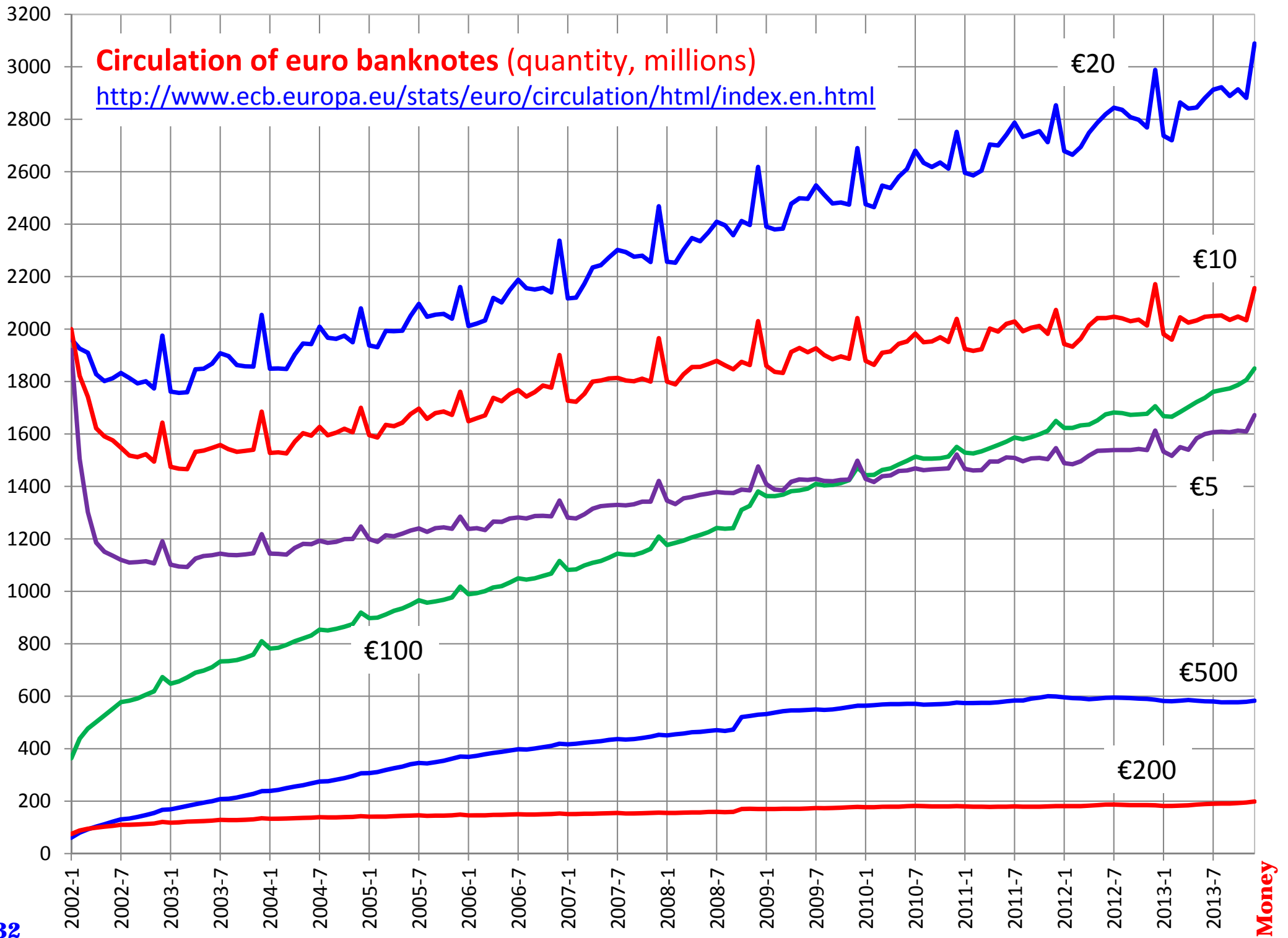






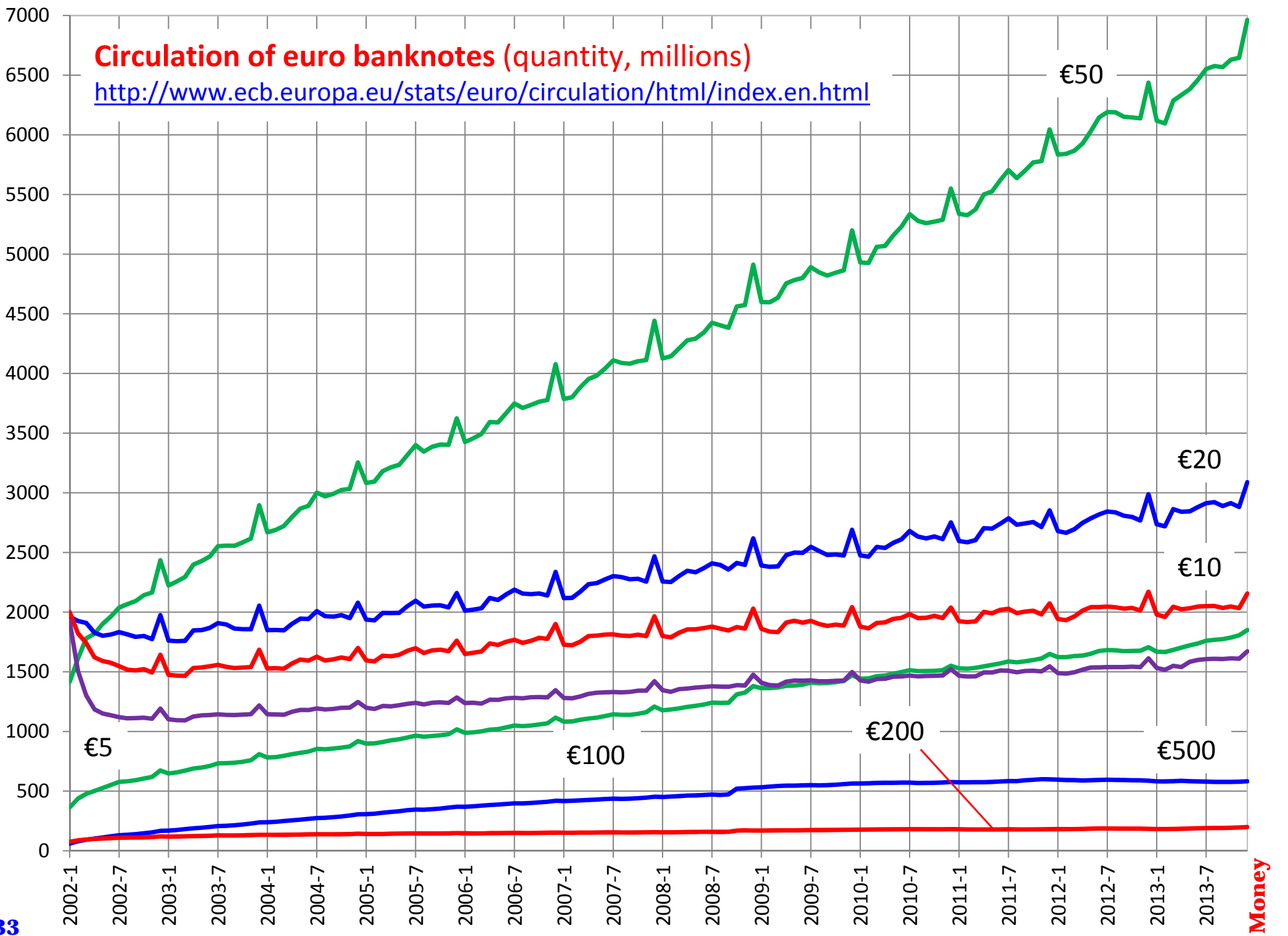
Circulation of euro banknotes (quantity, millions)

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Circulation of euro banknotes (quantity, millions)

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Circulation of euro banknotes

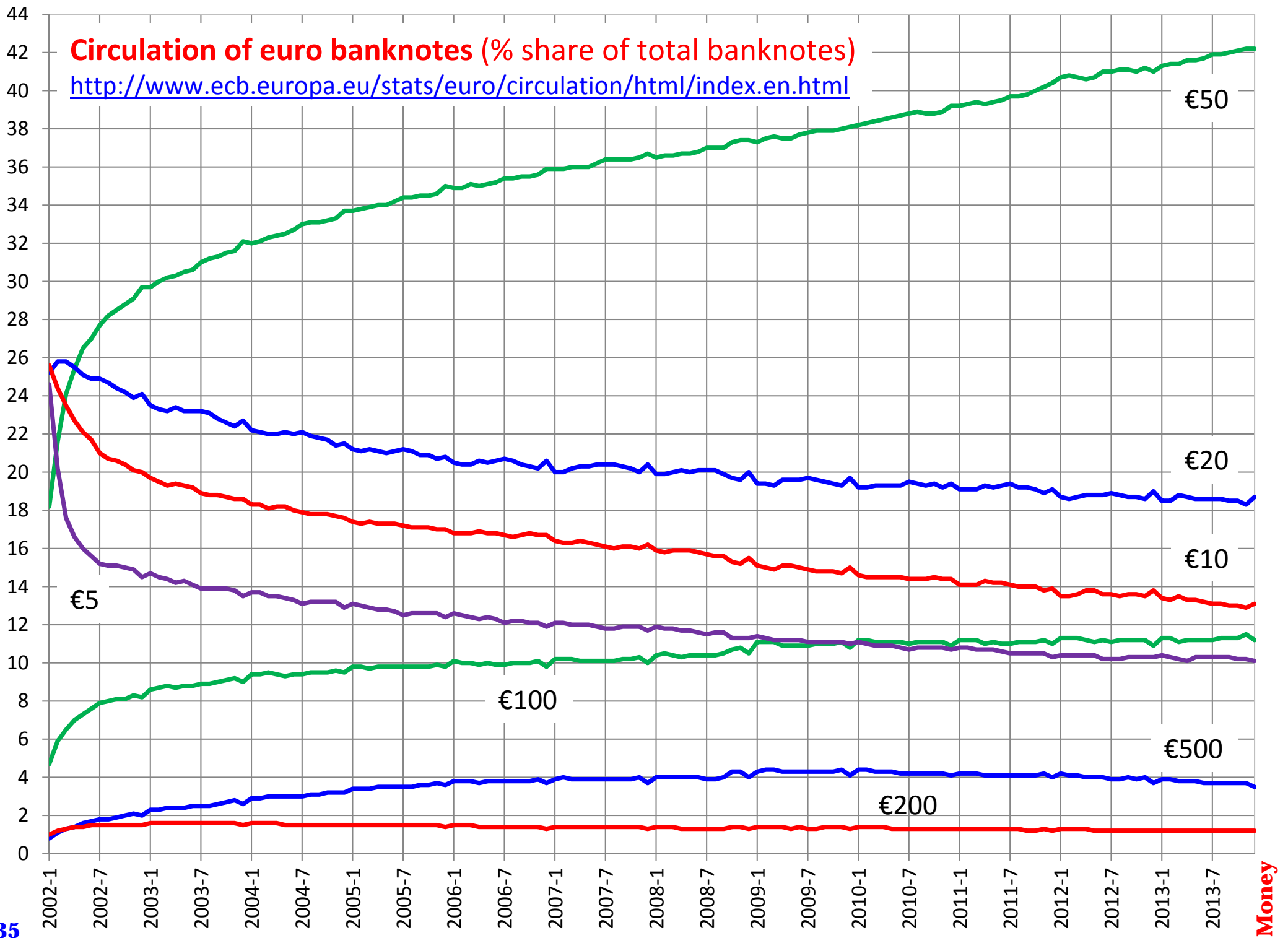
<i>Low denomination</i>	<i>Quantity (millions)</i>	<i>High denomination</i>	<i>Quantity (millions)</i>
5	1,672 10.1%	100	1,850 11.2%
10	2,156 13.1%	200	199 1.2%
20	3,089 18.7%	500	583 3.5%
50	6,963 42.2%	TOTAL	16,512

Eurozone (changing composition) · Dec 2013

<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.htm>

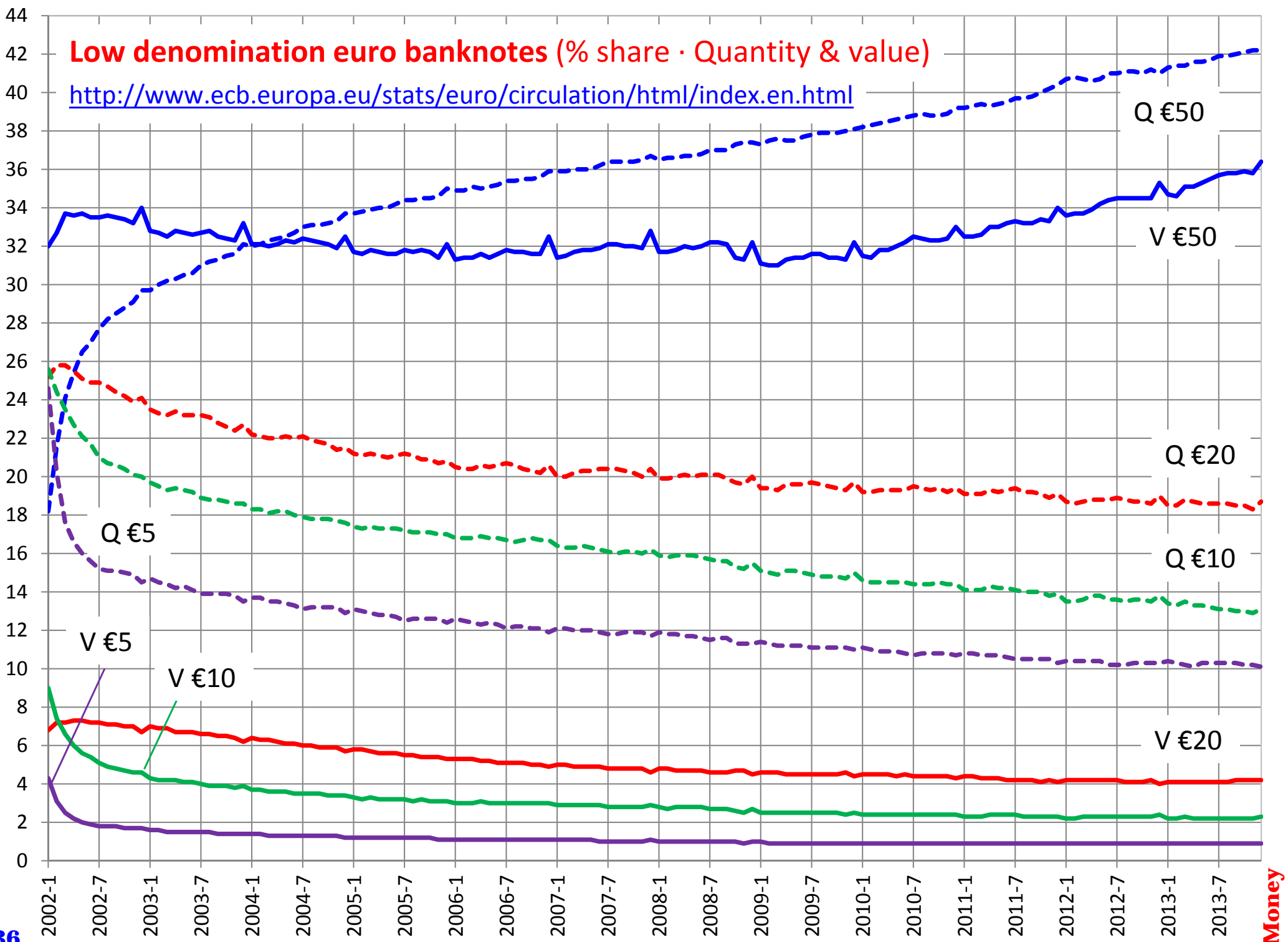
Circulation of euro banknotes (% share of total banknotes)

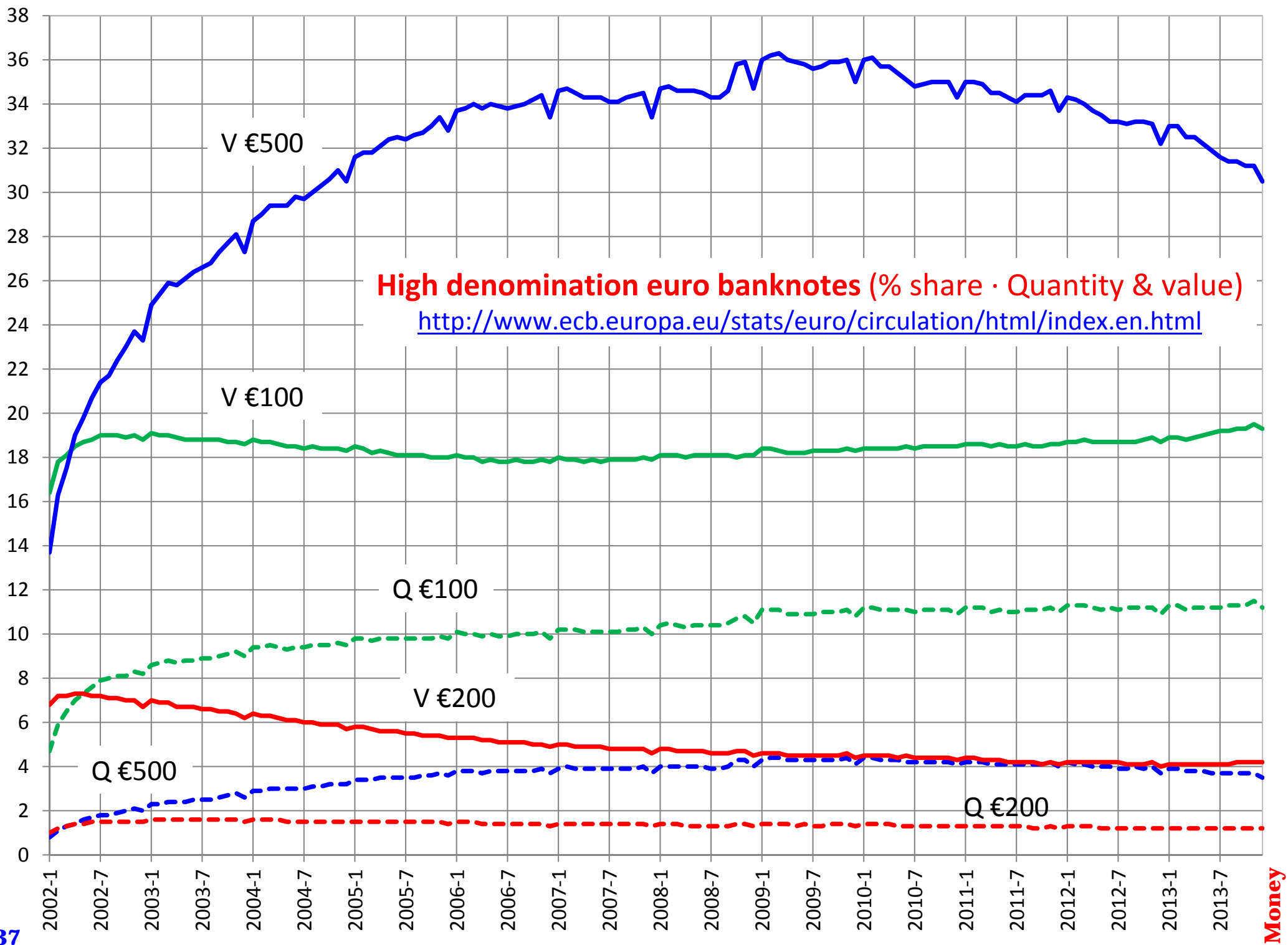
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Low denomination euro banknotes (% share · Quantity & value)

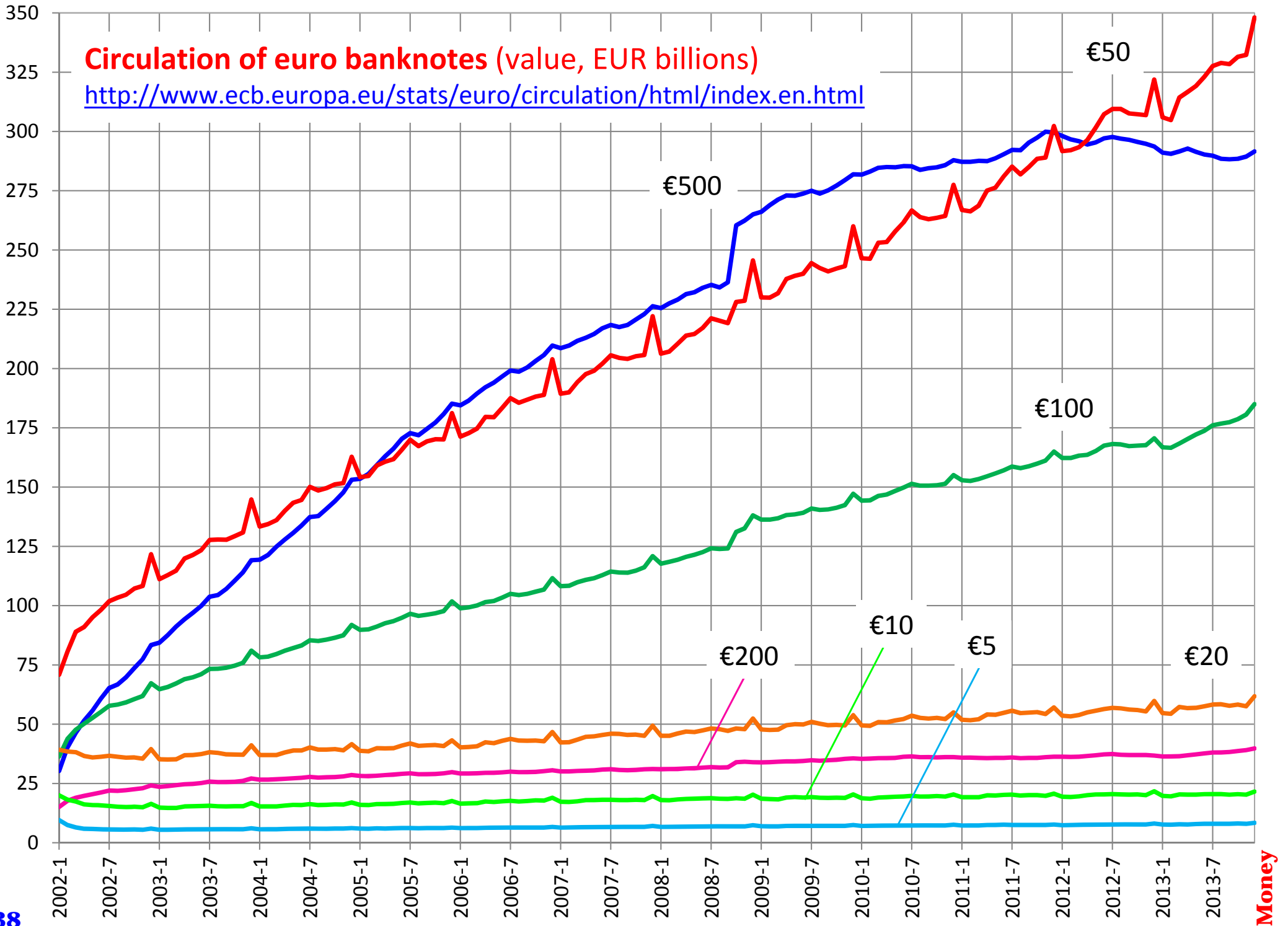
<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.html>





Circulation of euro banknotes (value, EUR billions)

<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.html>

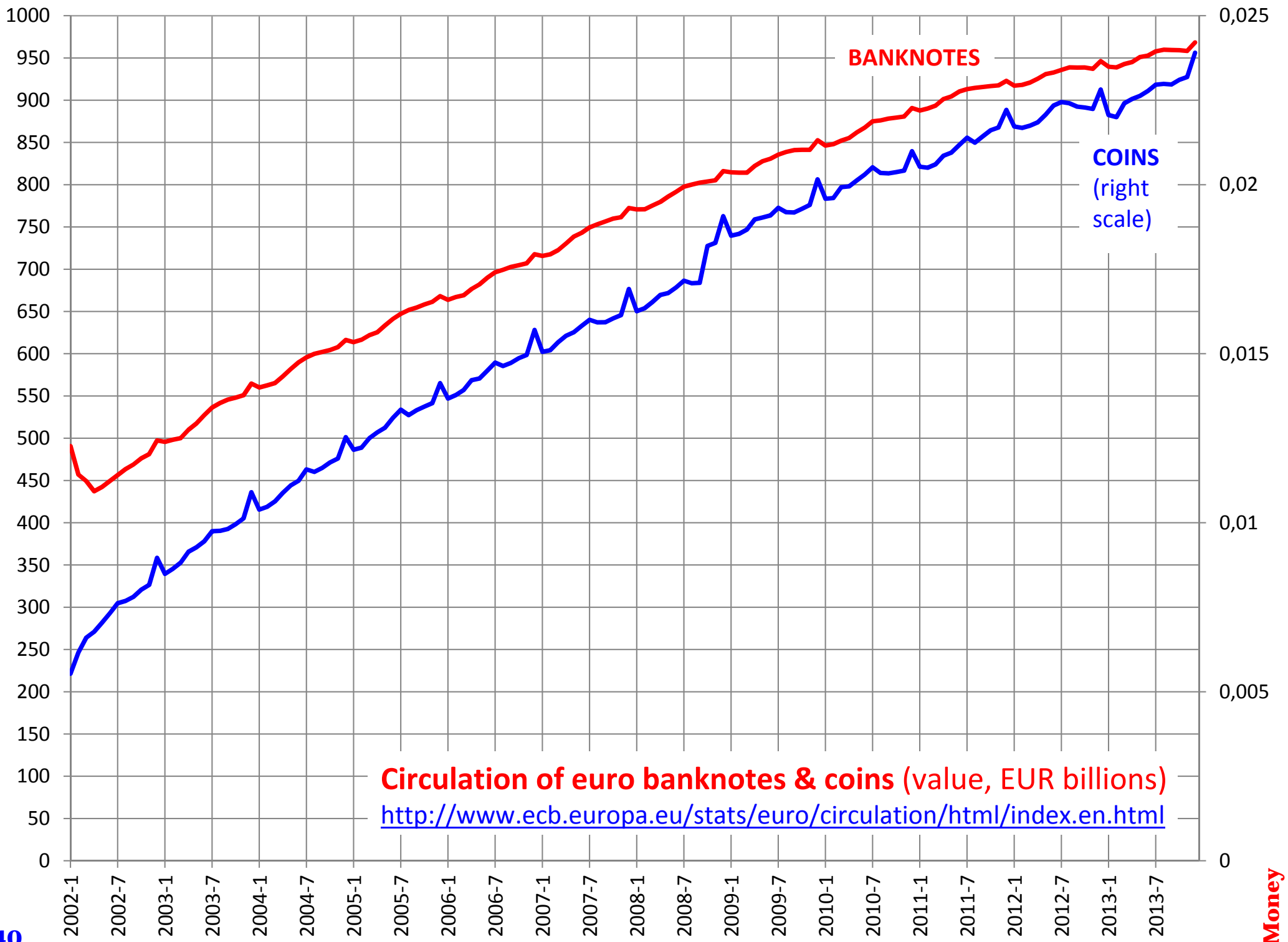


Circulation of euro banknotes

<i>Low denomination</i>	<i>Value (EUR billions)</i>	<i>High denomination</i>	<i>Value (EUR billions)</i>
5	8.4 0.9%	100	185 19.3%
10	21.6 2.3%	200	39.8 4.2%
20	61.8 6.5%	500	291.6 30.5%
50	348.1 36.4%	TOTAL	956.2

Eurozone (changing composition) · Dec 2013

<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.htm>



Circulation of euro banknotes & coins (value, EUR billions)

<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.html>

Circulation of euro banknotes (SPA)

<i>Low denomination</i>	<i>Quantity (millions)</i>	<i>High denomination</i>	<i>Quantity (millions)</i>
5	-79	100	24
10	-840	200	13
20	-1,132	500	81
50	862	Pesetas (EUR millions)	806

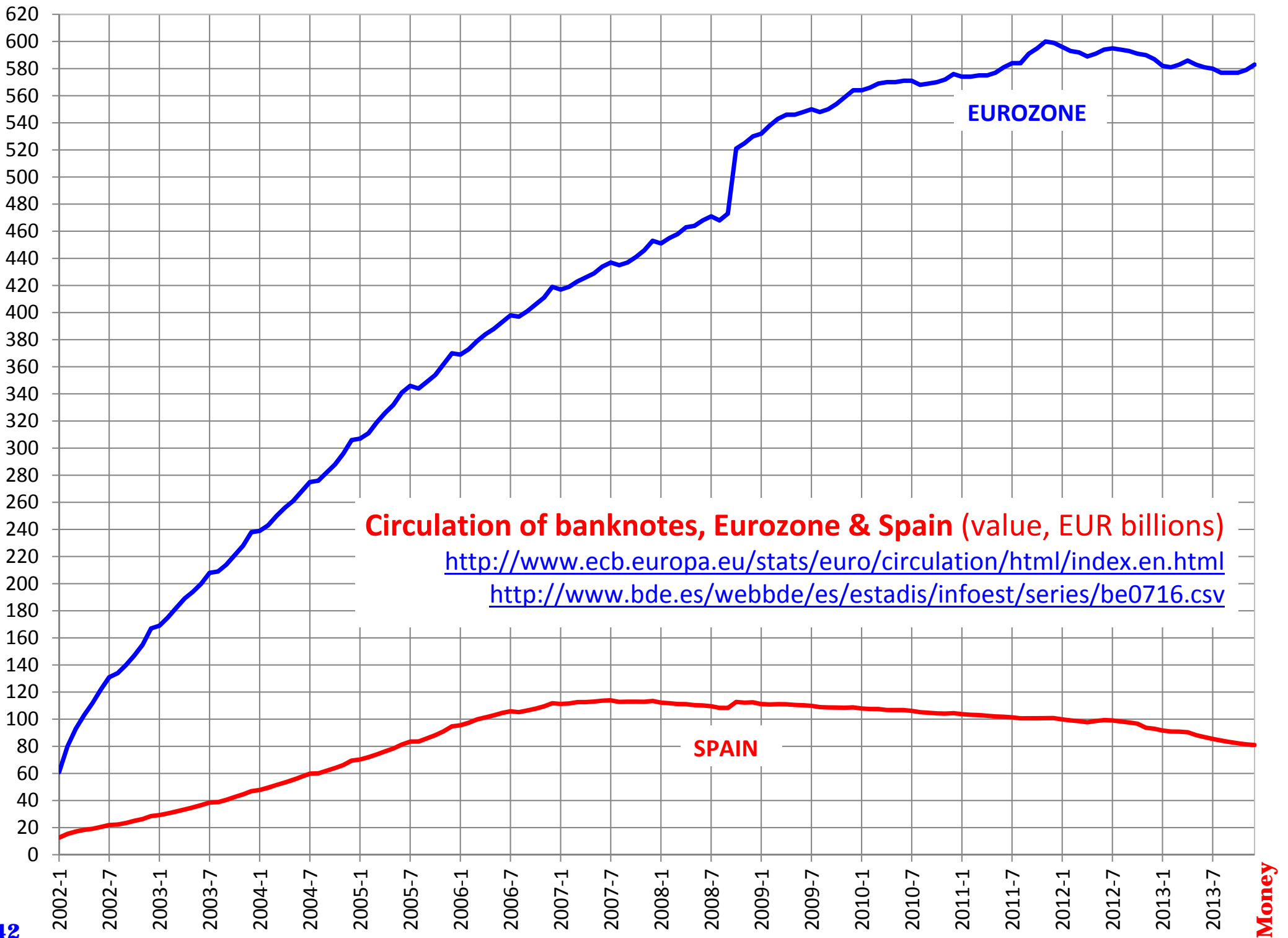
Net circulation (issued – returned) · Dec 2013

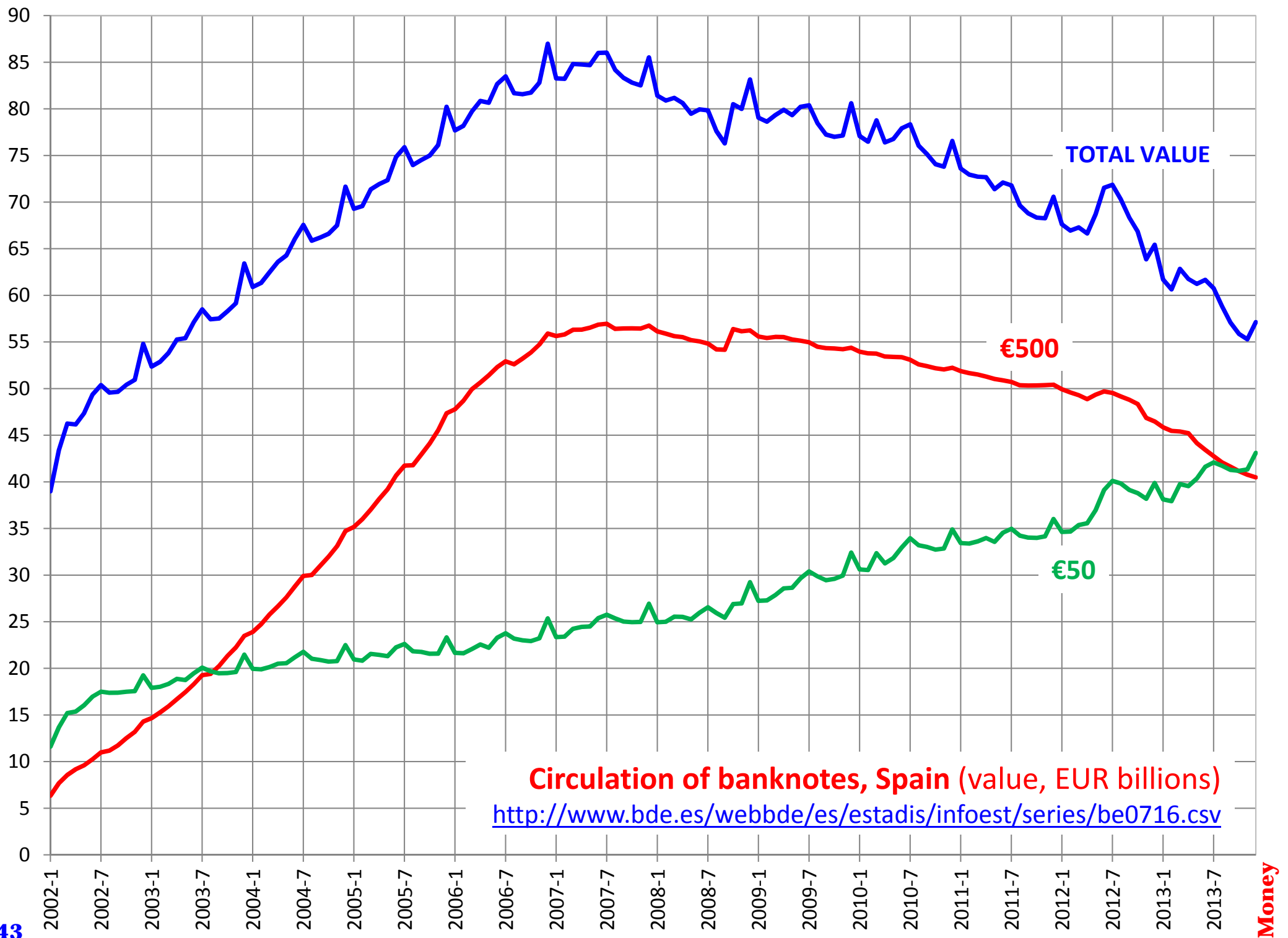
<http://www.bde.es/webbde/es/estadis/infoest/bolest7.html>

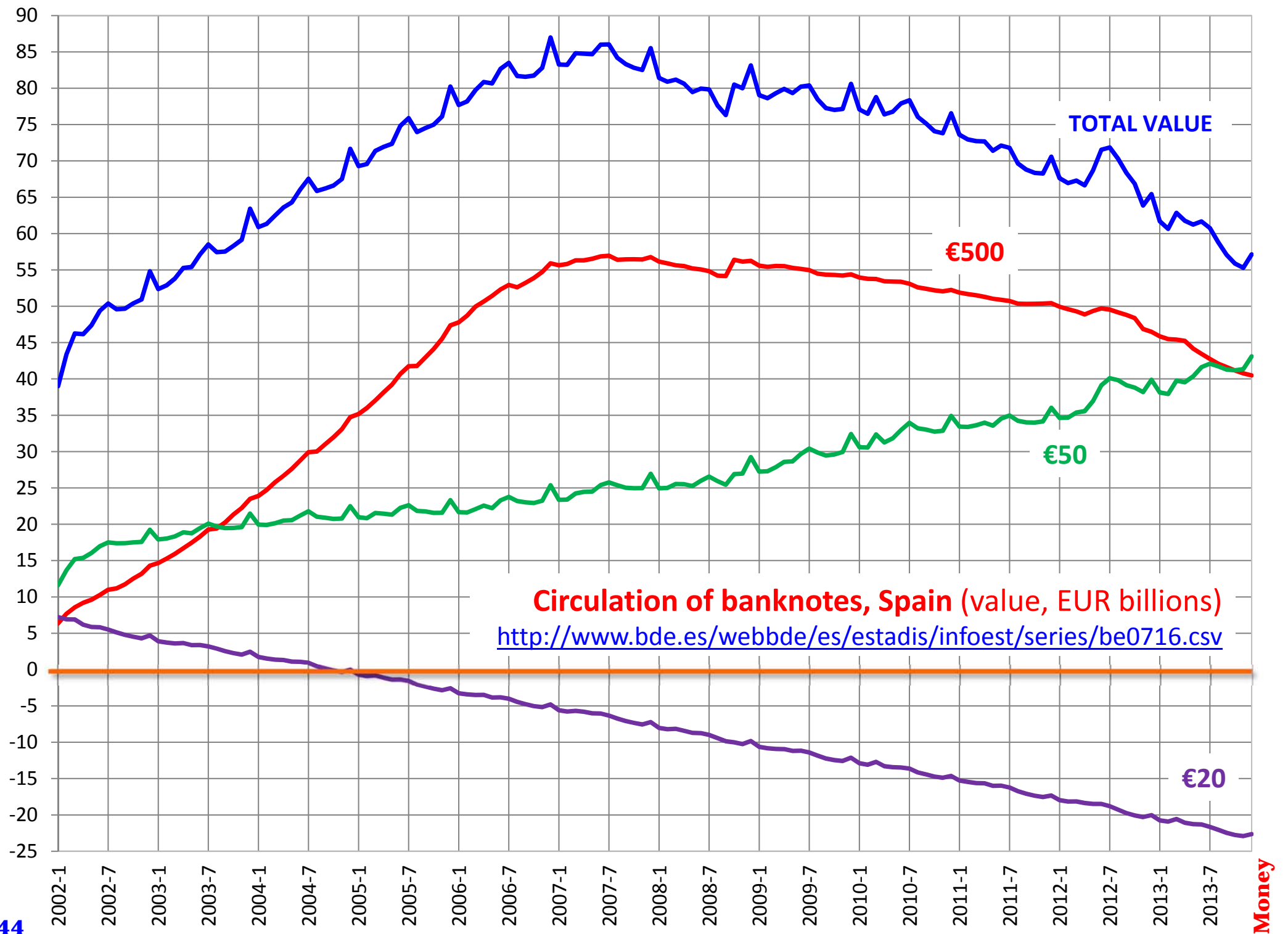
Circulation of banknotes, Eurozone & Spain (value, EUR billions)

<http://www.ecb.europa.eu/stats/euro/circulation/html/index.en.html>

<http://www.bde.es/webbde/es/estadis/infoest/series/be0716.csv>







Monetary aggregates

- Monetary aggregates are technical ways of defining (measuring the amount of) money.
- $M0 = \text{monetary base} = \text{high-powered money} = E + R$
 - ▶ $E = \text{currency held by the public (cash)}$
 - ▶ $R = \text{bank reserves} = \text{currency in bank vaults} + \text{the banks' deposits at the central bank}$
- $M1 = E + D$ (money stock/supply, monetary mass)
 - ▶ $D = \text{deposits} = \text{non-interest-bearing accounts at banks}$
- $M2 = M1 + \text{savings deposits}$
- $M3 = M2 + \text{time deposits} + \text{others}$

Technical definitions of money (ECB)

- “M1: a narrow monetary aggregate that comprises currency in circulation [banknotes and coins] plus overnight deposits held with MFIs [monetary financial institutions] and central government (e.g. at the post office or treasury).”
- “M2: an intermediate monetary aggregate that comprises M1 plus deposits redeemable at a period of notice of up to and including 3 months (i.e. short-term savings deposits) and deposits with an agreed maturity of up to and including 2 years (i.e. short-term time deposits) held with MFIs and central government.”

Technical definitions of money (ECB)

- “M3 is a broad monetary aggregate that comprises M2 plus marketable instruments, in particular repurchase agreements, money market fund shares and units, and debt securities with a maturity of up to and including two years issued by MFIs”.
- “These aggregates differ with regard to the degree of moneyness of the assets included”.

ECB Monthly Bulletin (glossary)

<http://www.ecb.europa.eu/pub/mb/html/index.en.html>

<http://www.ecb.europa.eu/pub/pdf/mobu/mb201401en.pdf>

Technical definitions of money (ECB)

Liabilities (1)	M1	M2	M3
Currency in circulation	X	X	X
Overnight deposits	X	X	X
Deposits with an agreed maturity up to 2 years		X	X
Deposits redeemable at a period of notice up to 3 months		X	X
Repurchase agreements			X
Money market fund (MMF) shares/units			X
Debt securities up to 2 years			X

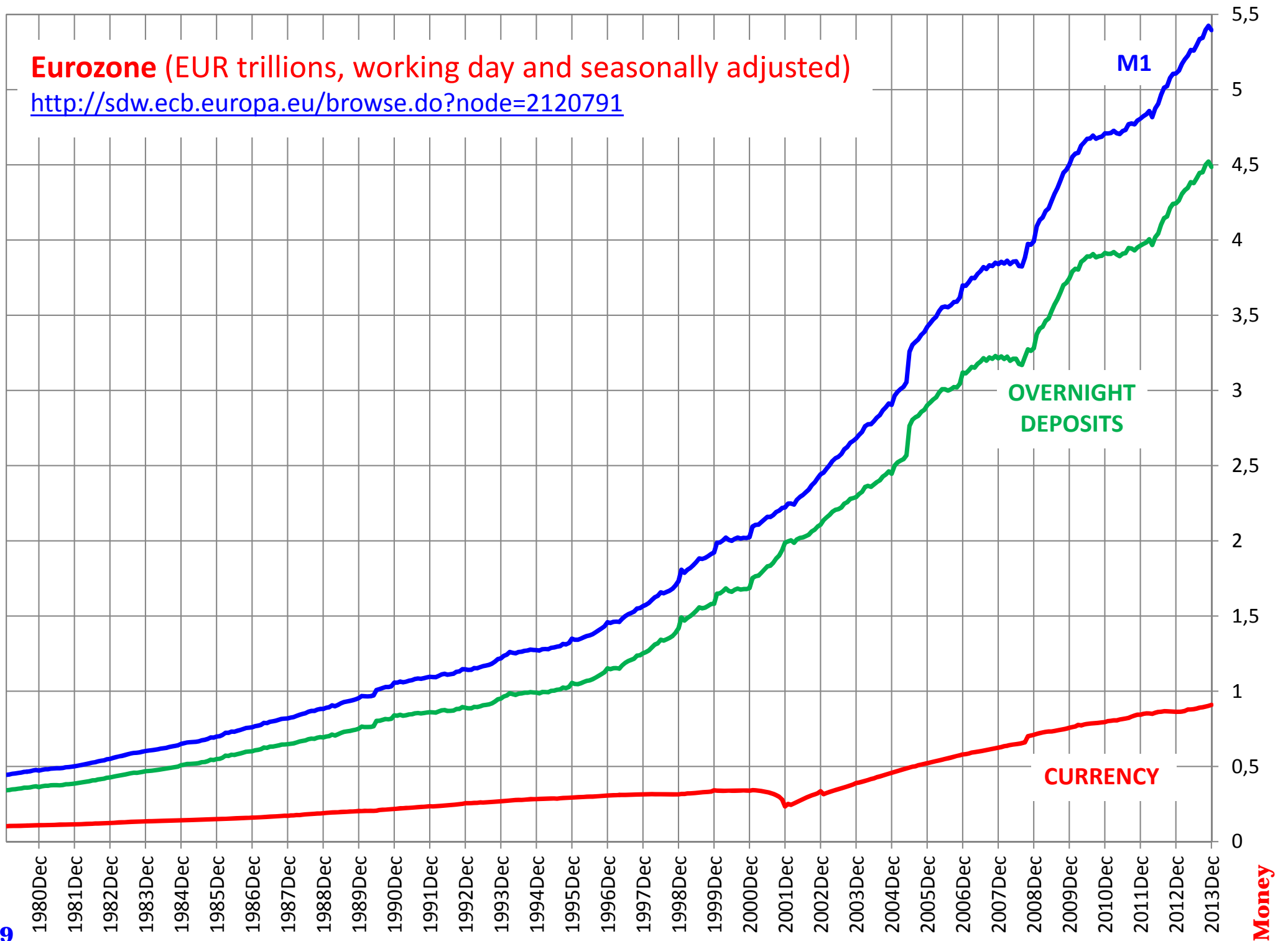
(1) Liabilities of the money-issuing sector and central government liabilities with a monetary character held by the money-holding sector.

overnight deposits = balances which can immediately be converted into currency or used for cashless payment

<http://www.ecb.europa.eu/stats/money/aggregates/aggr/html/hist.en.html>

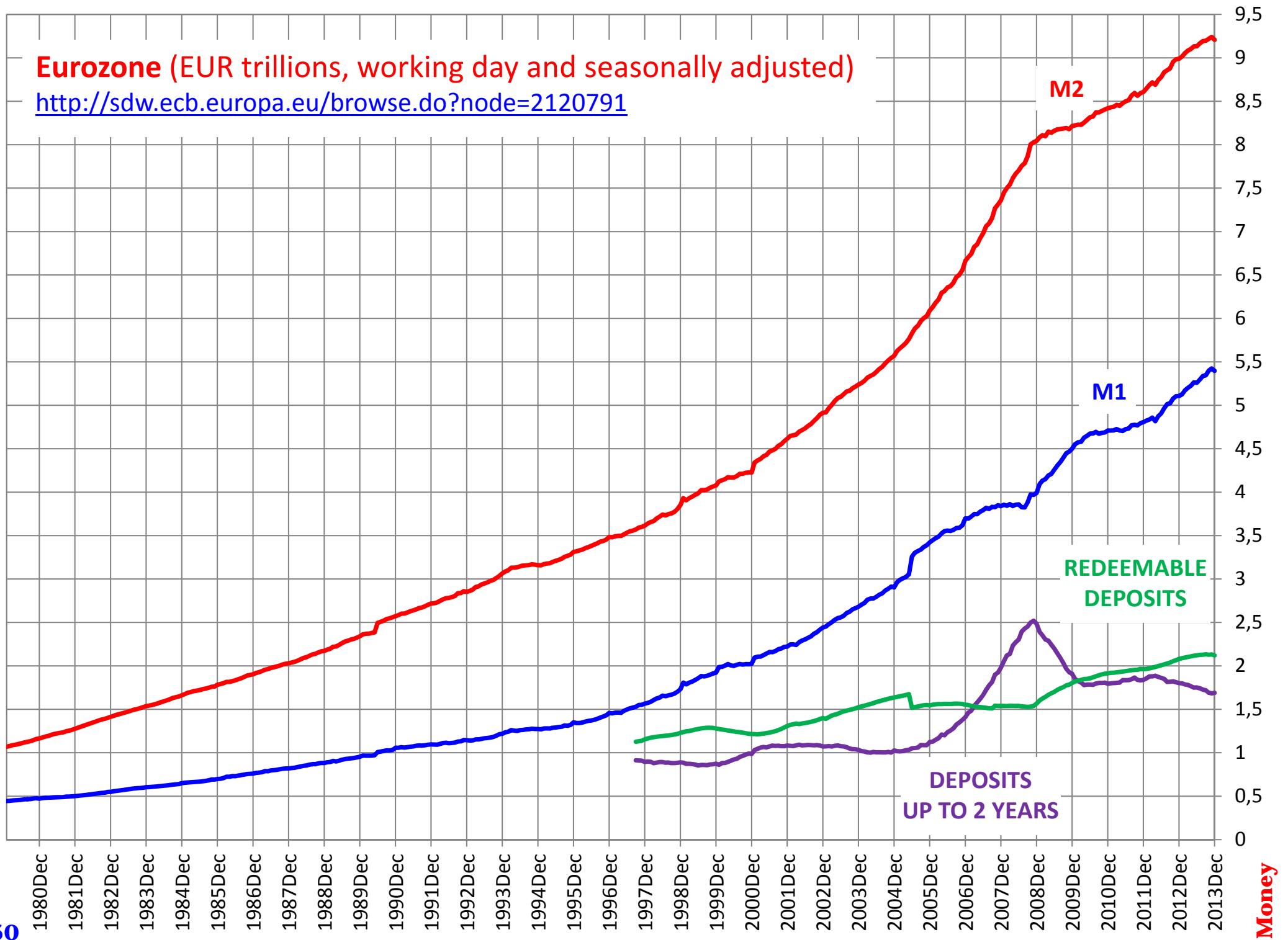
Eurozone (EUR trillions, working day and seasonally adjusted)

<http://sdw.ecb.europa.eu/browse.do?node=2120791>



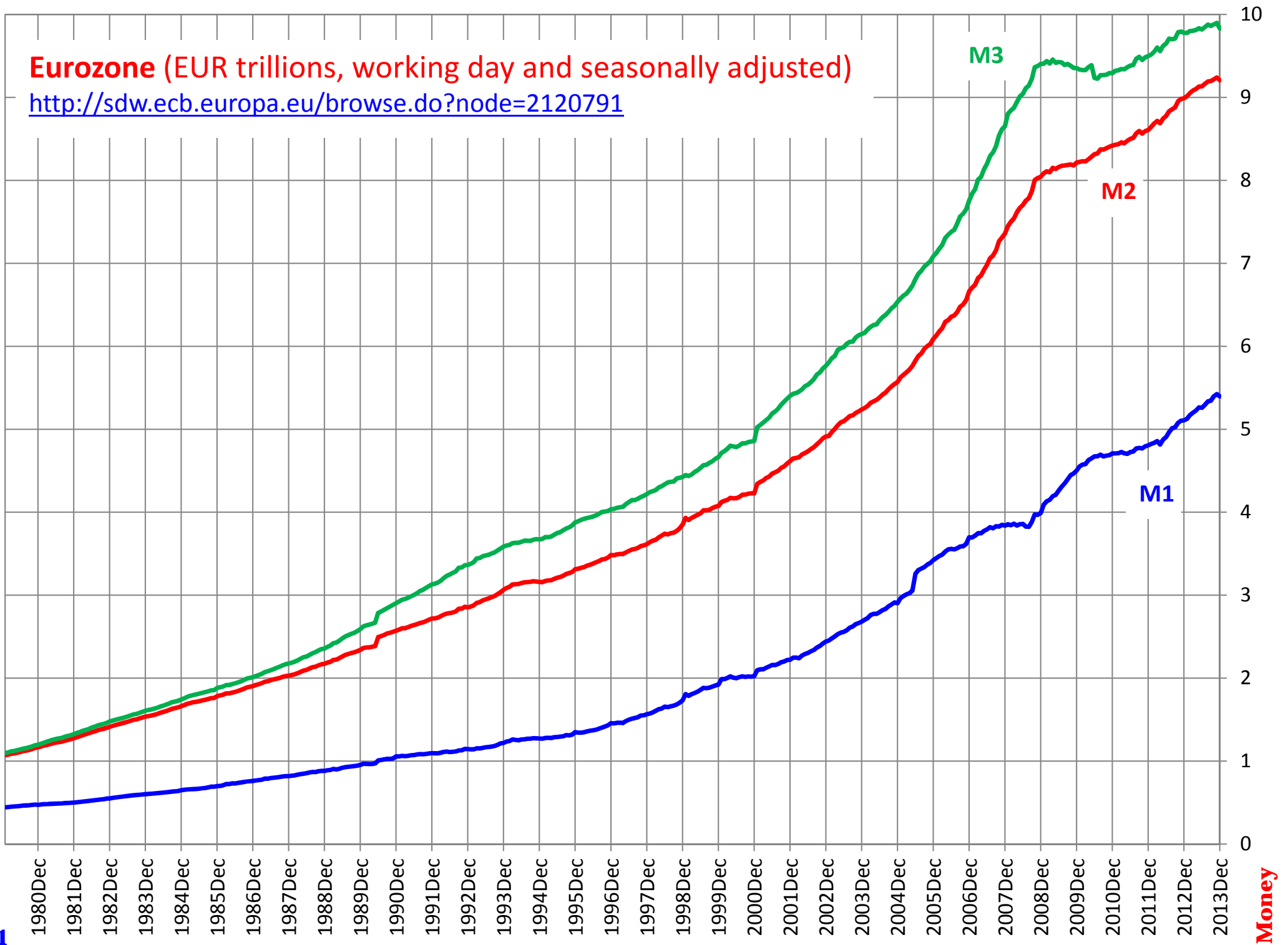
Eurozone (EUR trillions, working day and seasonally adjusted)

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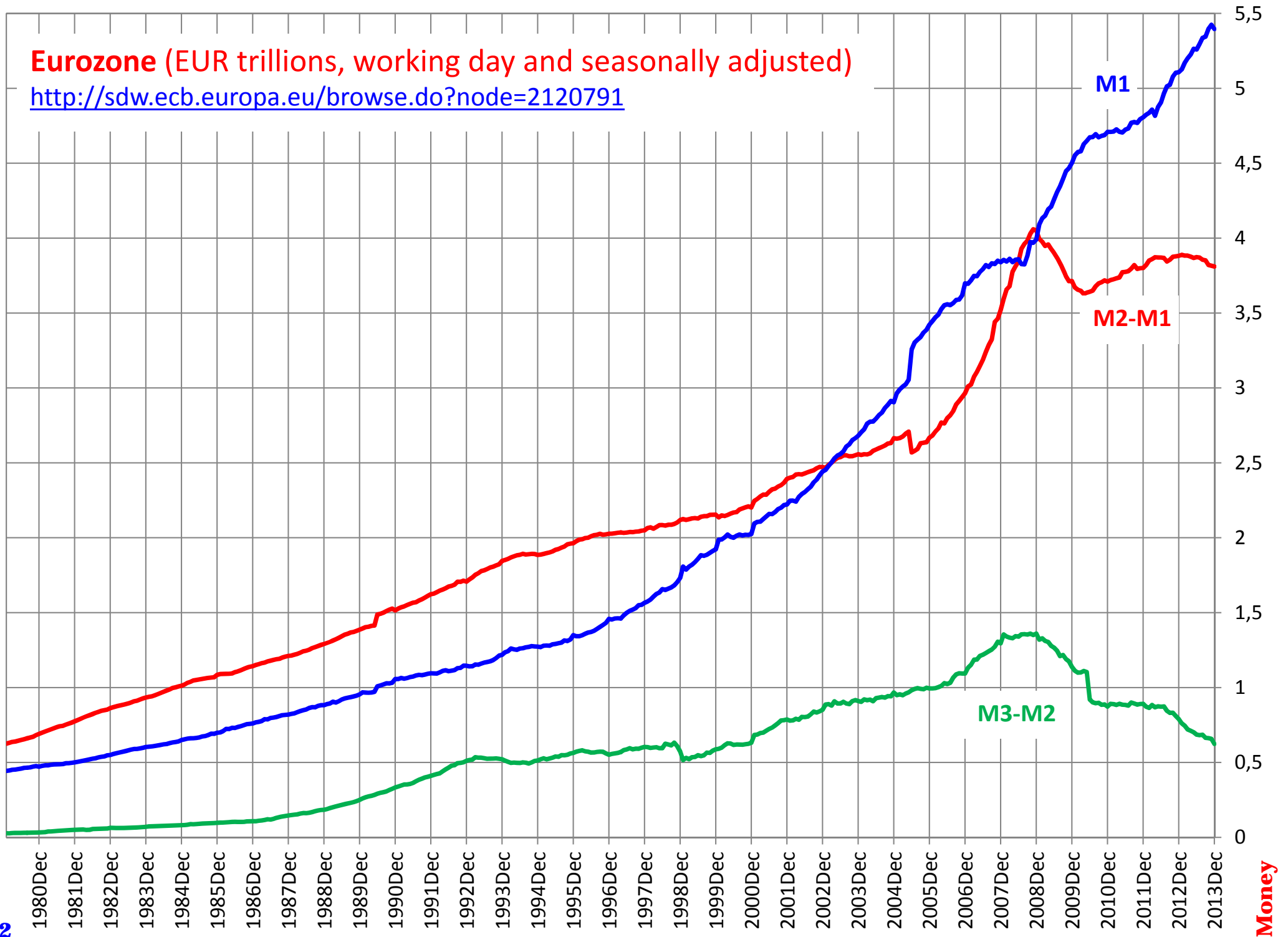
Eurozone (EUR trillions, working day and seasonally adjusted)

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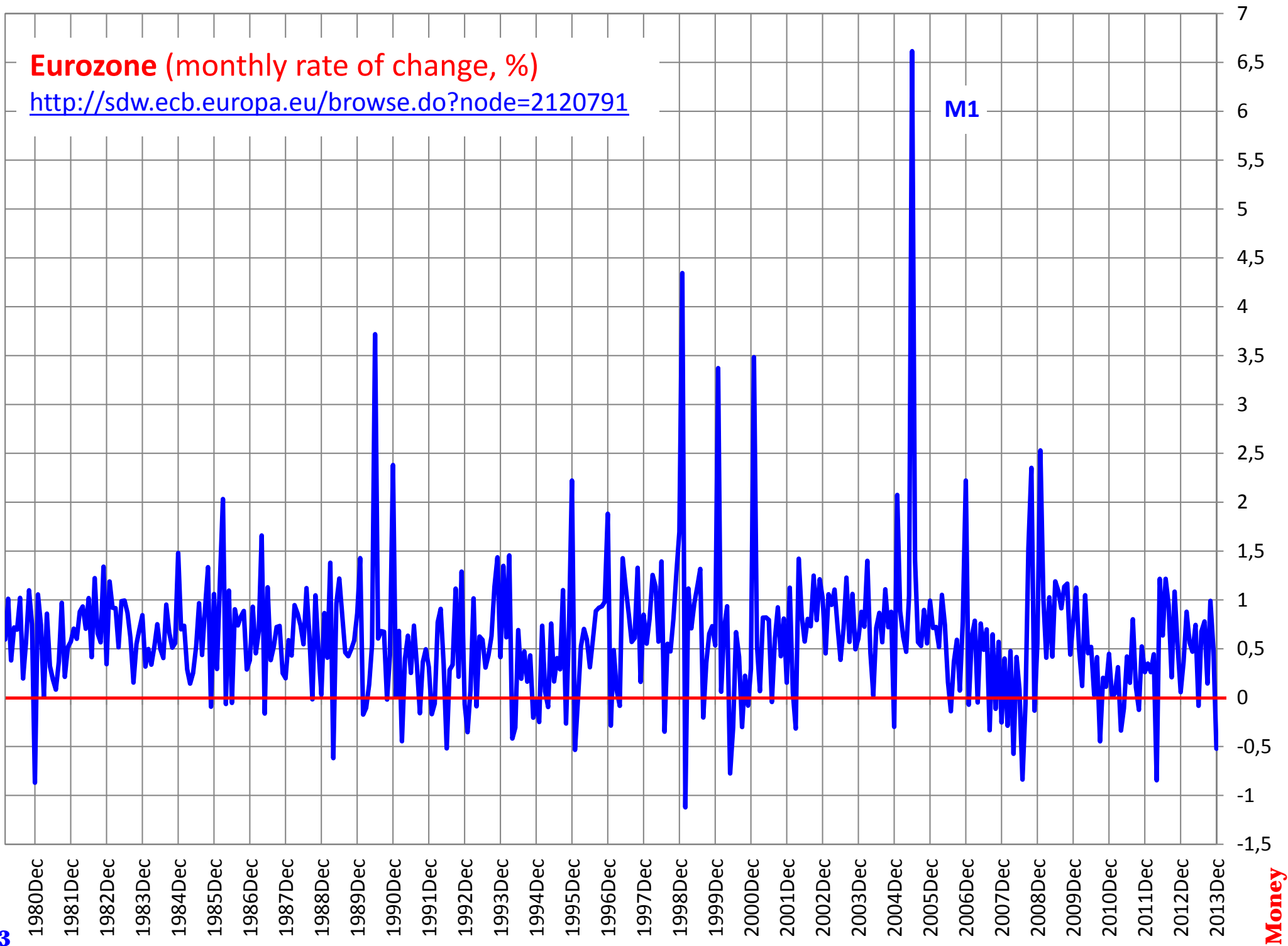
Eurozone (EUR trillions, working day and seasonally adjusted)

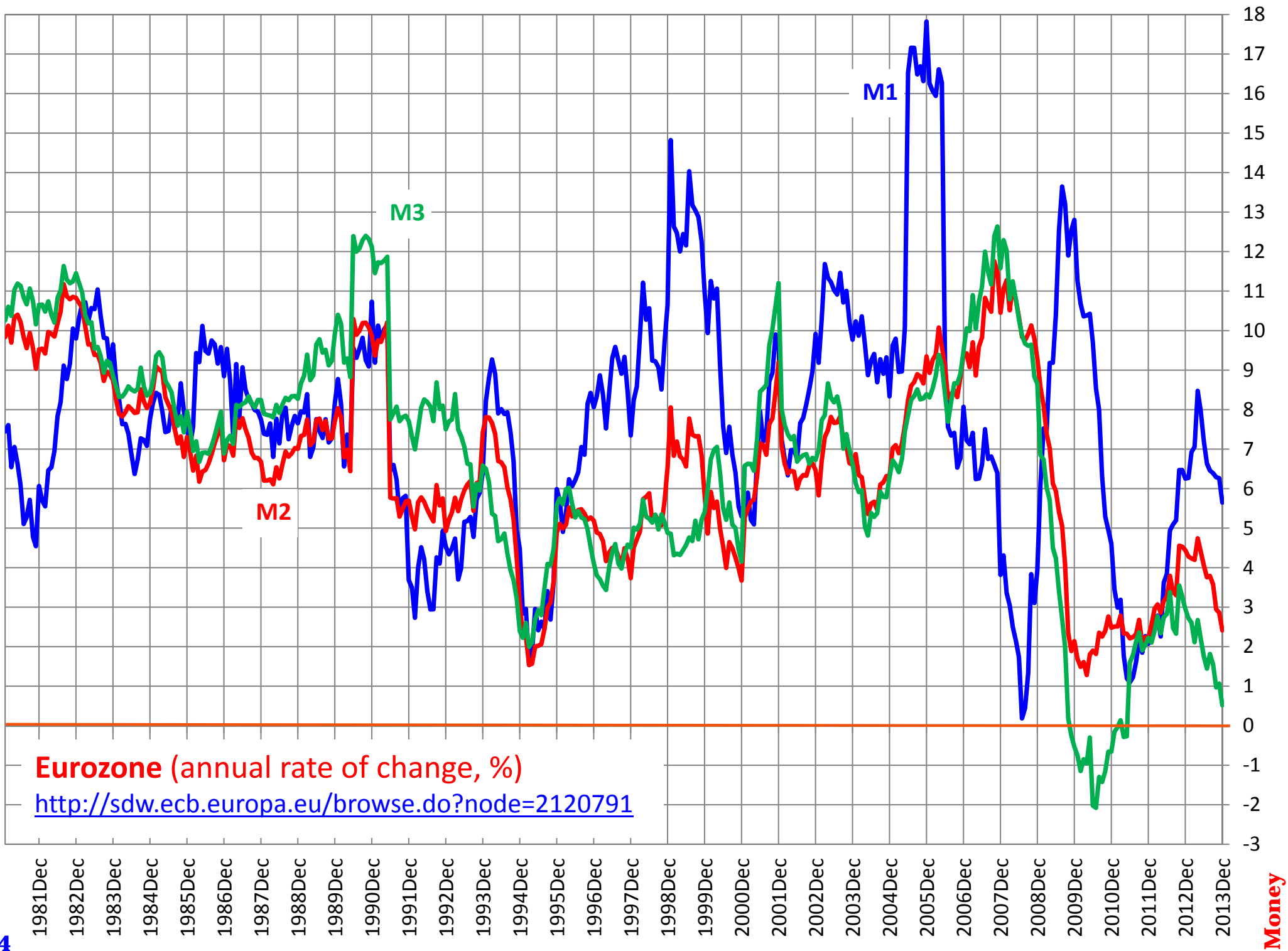
<http://sdw.ecb.europa.eu/browse.do?node=2120791>



Eurozone (monthly rate of change, %)

<http://sdw.ecb.europa.eu/browse.do?node=2120791>





The textbook model of money creation

- The cash reserve ratio $r = R/D$ is the amount of reserves banks must hold per euro of deposit. It is the percent of deposits banks cannot lend.
- The liquidity ratio $l = E/D$ is the amount of currency that people hold per euro of deposits.
- The money multiplier is $mm = \frac{1 + l}{r + l}$.
- It then follows that $M1 = mm \cdot M0$, so $mm = \frac{M1}{M0}$.
Hence, if mm remains constant, $\Delta M1 = mm \cdot \Delta M0$.

The money multiplier

- Calling the money stock $M1$, the money multiplier mm indicates how many units of money stock is generated by one unit of monetary base.
- In fact, $M1 = E + D$ and $l = E/D$ imply $M1 = l \cdot D + D = D(1 + l)$. In addition, $M0 = E + R$, $l = E/D$, and $r = R/D$ yield $M0 = l \cdot D + r \cdot D = D(r + l)$. In sum,

$$\frac{M1}{M0} = \frac{D(1 + l)}{D(r + l)} = \frac{1 + l}{r + l} = mm .$$

- Therefore, $M1$ (the money stock) is a fixed multiple (mm) of $M0$ (the monetary base).

Money creation process /1

- Suppose M_0 is increased by €600 million. For instance, the central bank buys financial assets from the banks and pays by increasing €600 million the reserves of banks on the central bank.
- Since the deposits D on banks have not changed, banks have an excess of reserves equal to 600. They can then lend the 600 million to consumers and firms. Let consumers and firms be always willing to borrow any amount offered by banks.
- The people that borrow the €600 million will spend them buying goods or financial assets.

Money creation process /2

- The sellers of the goods or the financial assets get €600 million. Let $l = \frac{1}{5} = 0.2$, so people hold 0.2 cents in cash for each euro deposited on banks.
- People must then allocate the €600 million in cash and deposits to make the increase in cash ΔE divided by the increase in deposits ΔD equal to 0.2. The equations giving the solution are
 - $\Delta E + \Delta D = 600$ and
 - $\Delta E / \Delta D = 1/5$ or, equivalently, $\Delta D = 5 \cdot \Delta E$.

As a result, $\Delta D = 500$ and $\Delta E = 100$.

Money creation process /3

- This means that people deposit €500 million on banks and hold €100 million in cash. Suppose $r = 0.1$. Hence, banks only need to keep as reserves the 10% of new deposits and can lend the rest. The following table summarizes the process so far.

<i>round</i>	$\Delta M0$	ΔD	ΔE	ΔR	$\Delta \text{loans} = \Delta D - \Delta R$	$\Delta M1 = \Delta E + \Delta D$
1	600			600	600	
2		500	100	50	450	600

- Now the process recommences: people borrow and spend 450, and those receiving the 450 keep a part in cash (75) and deposit the rest (375) on banks.

Money creation process /4

- The following table represents the process.

<i>round</i>	$\Delta M0$	ΔD	ΔE	ΔR	$\Delta \text{loans} = \Delta D - \Delta R$	$\Delta M1 = \Delta E + \Delta D$
1	600			600	600	
2		500	100	50	450	600
3		375	75	37.5	337.5	450
4		281.25	56.25	28.125	253.125	337.5
5		210.9..	42.1...	210.9...	189.84...	253.125
...	
TOTAL	600	2,000	400	200	1,800	2,400

- Deposits grow continuously: $500 + 375 + 281.25 + 210.9 + \dots$. In the limit, the sum converges to 2,000.

Money creation process /5

- $M0$ was initially increased by 600. What fraction is finally held in cash? The sum $100 + 75 + 56.25 + 42.18 + \dots$, which converges to 400.
- Since $M0 = E + R$, $\Delta M0 = \Delta E + \Delta R$. That is, $600 = 400 + \Delta R$. Thus, $\Delta R = 200$. This is also the value to which the sum $50 + 37.5 + 28.125 + 21.09 + \dots$ converges (the 600 at round 1 should not be counted because banks lend this amount: they represented voluntary, not legal reserves).
- $M0 = E + D$ yields $\Delta M1 = \Delta E + \Delta D$. As $\Delta E = 400$ and $\Delta D = 2,000$, $\Delta M1 = 2,400$: an increase of 600 in $M0$ is transformed into an increase of 2,400 in $M1$.

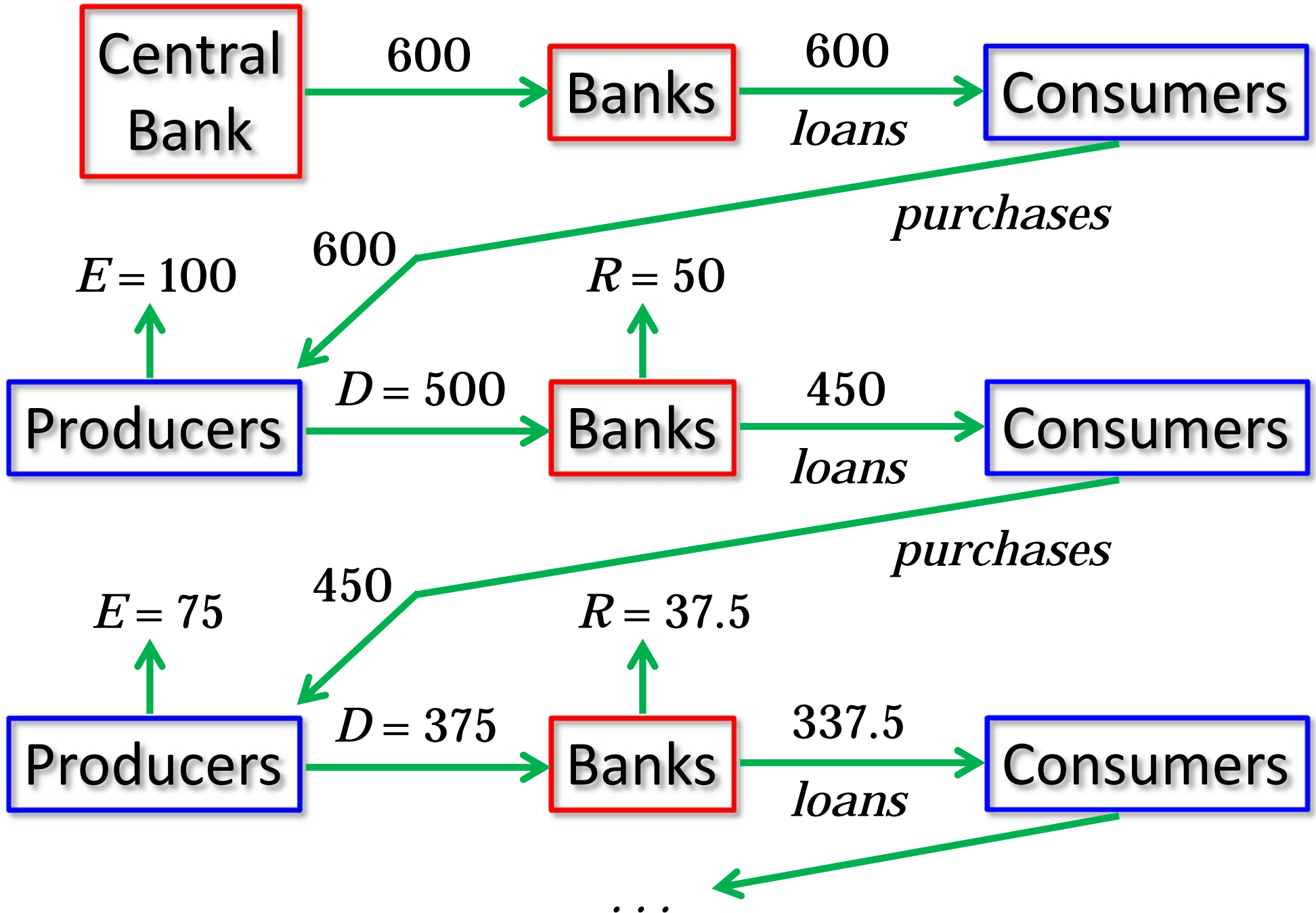
Money creation process /6

- This suggests that the money multiplier mm must be 4 : $\Delta M0 = 600$ generates $\Delta M1 = 2,400$. In fact,

$$mm = \frac{1+l}{r+l} = \frac{1+0.2}{0.1+0.2} = \frac{1.2}{0.3} = \frac{12}{3} = 4.$$

- mm captures the total effect on the cash held by the people and the deposits generated by the process
... \Rightarrow \uparrow deposits \Rightarrow \uparrow loans \Rightarrow \uparrow expenditures \Rightarrow
 \Rightarrow \uparrow revenues \Rightarrow \uparrow deposits \Rightarrow \uparrow loans \Rightarrow ...
- This sequence illustrates the interaction between the financial side (deposits and loans) and the real side (purchases of goods).

Summary of the textbook money creation process



The reality of bank lending

- In the model, banks need to receive a deposit to lend. In reality, when a bank makes a loan, the money lent is not taken from anyone's account nor from the bank's funds: it is created out of thin air.
- As deposits are accounting entries in a computer, the bank creates the money by crediting its customer's account with the amount of the loan and balancing this liability by registering the amount of the loan as an asset. The bank is not actually providing cash but the promise to provide cash. But that promise, the account at the bank, counts as cash.

Banking system's shaky foundations

- Problem: the banks promise to deliver something that they cannot deliver, as there is not enough cash in an economy to cash all bank deposits. In a bank run a large number of customers decide to withdraw their deposits simultaneously.
- In slide 60, deposits worth 2,000 are created, but they are backed by only the additional 600 in cash.
- In Spain, the Deposit Guarantee Fund of Credit Institutions guarantees up to €100,000 per deposit in case of bankruptcy. The fund ended 2012 with a shortfall of €1.263 billion. <http://www.fgd.es/en/index.html>

Banking business: fraud & catastrophe

- 1/ Banking works as long as everyone believes it does. If confidence is lost, the system collapses because it relies on the fiction of unexisting money.
- 2/ The creation of bank money (loans) rests only on the bank's belief that the borrowers can repay.
- 3/ Nothing controls the scale/timing of bank lending. Banks lend freely until they fear a default on repayments. New loans are refused and economic activity declines: ↓ lending, ↓ expenditure, ↓ production, ↓ employment, ↓ lending.