The euro as an anchor currency and core of a currency bloc

The global monetary system comprises a variety of exchange rate arrangements. These range from floating exchange rates, more or less strictly fixed exchange rate pegs, to the use of a single currency, as in a monetary union. However, the official exchange rate regime does not always match the arrangements actually in place.

Two major currency blocs have emerged in the global monetary system. In addition to the US dollar, it is above all the euro that is used in many countries as legal tender or as an anchor currency. The two currency blocs embrace a similar number of countries and dependent territories (around 60) although, measured by gross domestic product, the euro bloc is slightly smaller. In terms of its composition, however, the euro bloc has proved to be exceptionally stable.

This article gives an overview of the exchange rate arrangements in common use and discusses some of the implications of selecting a particular regime. It analyses the economic determinants that are conducive to membership of the euro or US dollar bloc. In this context, the article also considers whether a country's economic structure may make it appear expedient to abandon its existing monetary regime. This turns out not to be the case for any of the European countries in the euro bloc. However, countries' underlying structural suitability for using or being pegged to the euro cannot per se ensure an ongoing friction-free exchange rate regime. Instead, this requires national economic policies to be stringently adapted to the conditions of a fixed exchange rate system or monetary union.

Overview of different exchange rate arrangements

Classification scheme for exchange rate regimes

Under the statutes of the International Monetary Fund (IMF), member states have been free since the late 1970s to select which exchange rate regime they use, although they must report their current arrangements to the IMF once a year. However, various studies have revealed a discrepancy in many cases between the officially reported exchange rate regime and the arrangements actually in place.[1] In the meantime, a number of schemes have been developed to classify exchange rate arrangements based on actual practice rather than the countries' official notifications.[2] The IMF reacted by drawing a distinction between *de jure* exchange rate systems, ie those reported by the member states, and *de facto* arrangements, ie those actually in use, and in November 1998 began publishing a *de facto* classification of each member state's regime.[3]

Multifarious reality of exchange rate arrangements …

A fundamental distinction can be drawn between fixed exchange rate regimes, under which domestic monetary policy is subordinated to the external primacy of the fixed exchange rate target, and floating or flexible exchange rate arrangements, which allow monetary policy to have a domestic focus. The most stringent form of a fixed exchange rate regime is a system under which countries completely refrain from having a legal tender of their own and instead adopt the currency of the anchor country. In regimes which keep their own legal tender, the fixation of their currency's exchange rate is particularly strict in the case of a currency board. A law is passed stipulating that, first, the exchange rate against the anchor currency is irrevocably fixed and, second, that the monetary base may vary only in line with the foreign currency reserves. At the opposite end of the spectrum to fixed exchange rate arrangements are floating exchange rate regimes, in which parities are determined by the market.

Between the two above extremes is a continuum of exchange rate arrangements with a varying degree of exchange rate flexibility. Under conventional arrangements with fixed exchange rates, monetary policy is geared primarily to defending the fixed exchange rate parity, although the central rate may be adjusted in certain circumstances – ie in the event of a fundamental balance of payments disequilibrium. A distinction may be made between fixed central rates with and without a horizontal band, whereby band regimes – such as the European Exchange Rate Mechanism (ERM) II (see page 17) – allow the exchange rate a margin of fluctuation either side of the fixed central rate and therefore permit a greater degree of flexibility. This must be distinguished from exchange rate regimes with a crawling peg, in which inflation differentials between the countries concerned are offset by pre-announced systematic realignments of the central rate.

… with varying degree of exchange rate flexibility

International monetary system and the euro area

Of the 190 IMF member countries in total, at last count (April 2011), 92 had opted for fixed exchange rate regimes.[4] 32 states had various hybrid systems, and 66 flexible exchange rate arrangements. The IMF classifies all euro-area countries that let the euro float freely against other currencies as being in the group with flexible currency arrangements. Insofar as this

1 The relevant literature has been strongly influenced by the study of G A Calvo and C M Reinhart (2002), Fear of floating, Quarterly Journal of Economics 117, pp 379-408, which concluded that the "official" classification was often incorrect, especially for those countries reporting flexible exchange rate regimes.
2 The following classification schemes are among the better known: E Levy-Yeyati and F Sturzenegger (2003), To float or to fix: evidence on the impact of exchange rate regimes on growth, American Economic Review 93, pp 1173-1193; C M Reinhart and K S Rogoff (2004), The modern history of exchange rate arrangements: a reinterpretation, Quarterly Journal of Economics 119, pp 1-48; J C Shambaugh (2004), The effect of fixed exchange rates on monetary policy, Quarterly Journal of Economics 119, pp 301-352.
3 See, for example, K Habermeier, A Kokenyne, R Veyrune and H Anderson, Revised system for the classification of exchange rate arrangements, IMF Working Paper No 09/211.
4 For the purpose of this classification, the IMF categories "No separate legal tender", "Currency board", "Conventional peg", "Stabilized arrangement" and "Pegged exchange rate within horizontal bands" were assigned to the group of fixed-rate systems, while the categories "Floating" and "Free floating" were allocated to the group of flexible-rate regimes. See IMF (2011), Annual Report on Exchange Arrangements and Exchange Restrictions.

Fixed-rate regimes, flexible-rate regimes and hybrid exchange rate systems in Europe *

As at end-April 2011

Basic map: www.kartenwelten.de. * Classification based on IMF definition, Annual Report on Exchange Arrangements and Exchange Restrictions 2011 (fixed-rate regimes include the categories "No separate legal tender", "Currency board", "Conventional peg" and "Stabilised arrangement". Flexible-rate regimes include the categories "Floating" and "Free floating" while hybrid systems include the categories "Crawl-like arrangement" and "Other managed arrangement") and Deutsche Bundesbank, Exchange rate statistics, Tables IV.

Deutsche Bundesbank

also applies to the other major global currencies, such as the US dollar and the yen, the current global monetary system is dominated by flexible-rate regimes. Between one another, however, the euro-area countries apply the most stringent form of exchange rate fixation as they comprise a joint monetary union. Hence while the euro area as a whole, with its freely floating external euro, is at one end of the spectrum of exchange rate regimes, its individual member states, by surrendering their respective national currency and communitising monetary policy, are at the other end of the spectrum as regards their mutual internal currency relationship.

No exchange rate regime superior per se, all depends on the circumstances

The wide range of exchange rate arrangements indicates that no regime is intrinsically superior to the rest. This is confirmed by the fact that many countries have adopted different exchange rate regimes in the course of time. Whether a fixed or a flexible exchange rate system is better suited to achieving the macroeconomic goals of price stability, high employment, steady and appropriate economic growth and external equilibrium depends on the particular constellation of circumstances, which can change over time. Klein and Sham-

The implications of alternative exchange rate regimes

In accordance with the trilemma of monetary policy, which became clearly evident following the collapse of the Bretton Woods global fixed exchange rate system, it is impossible to freely combine fixed exchange rates, free movement of capital and independent monetary policy. Ultimately, fixed exchange rate regimes only work in a financial system with free capital flows if a domestically oriented monetary policy is abandoned in the event of a conflict of aims in favour of the monetary policy of the anchor currency country.

An externally oriented monetary policy and the associated loss of independence can, however, be justified if the effectiveness of a domestically oriented monetary policy is limited and the price stability of the anchor currency country can be "imported" by means of a fixed exchange rate peg. A further major advantage of fixed exchange rates is seen in the decline in exchange rate uncertainty and volatility. This presupposes, however, that monetary policy is geared to defending the exchange rate target and that the fixed exchange rates are credible. Krugman,[1] for instance, used a theoretical model to show that the credible announcement of an exchange rate target can *per se* have a stabilising effect on the exchange rate. The logic behind this is that the exchange rate is not determined solely by fundamentals and random fluctuations but also by expectations regarding exchange rate changes. Such expectations have a destabilising effect – via speculation – if the central bank's forex market interventions are not credible and market players anticipate a realignment or a regime change towards greater exchange rate flexibility.

As a result of the legally binding pegging to an internationally recognised anchor currency, a currency board immediately creates confidence in monetary policy, which is why it enjoys a relatively high degree of credibility. In regimes that have a looser exchange rate peg, however, the credibility of the exchange rate targets is limited and exchange rate risk cannot be eliminated completely. On the one hand, the option of adjusting the central rate has the advantage that fundamental macroeconomic imbalances can be reduced by adjusting the exchange rate. At the same time, however, defending the central rate becomes less credible. If an exchange rate band is additionally set up around the central parity rate, within which the exchange rate can float freely, the central bank can, albeit to a limited extent, pursue an independent monetary policy. Safeguarding the credibility of the regime does, however, require that the monetary policy scope be used to stabilise inflation expectations. The success of such a policy ultimately depends on the national central bank's monetary policy reputation. Finally, for a transitional period during which inflation differentials between the individual countries are very large, crawling-peg regimes may be suitable for stabilising the real exchange rate and thus price competitiveness.

1 See P R Krugman (1991), Target zones and exchange rate dynamics, Quarterly Journal of Economics 106, pp 669-682.

baugh,[5] who examined the exchange rate arrangements of a total of 125 countries from 1973 to 2004, found that, on average, these countries changed their exchange rate regime every five years. Eichengreen detects a trend in the 1980s and early 1990s towards abandoning regimes with adjustable fixed rates or with fluctuation bands in favour of irrevocably fixed or freely floating exchange rates.[6] He expressly welcomes this development, given the preceding crises within the European Monetary System and the destabilising danger of speculation. By contrast, Frankel is of the opinion that, given sufficient convergence and credibility, currency arrangements that permit a certain, but limited, degree of exchange rate flexibility can be a viable alternative, and that the regimes at the two opposite poles of the currency policy continuum can themselves come under pressure as a result of speculation.[7]

The euro bloc

The euro as legal tender

The euro bloc may be defined as comprising all the countries and regions that use the euro as legal tender or whose currency is pegged to it. This area is shown in the maps on pages 18 and 19. The core of the euro bloc comprises the 17 euro-area member states: Austria, Belgium, Cyprus, Estonia, Finland, France (including a number of French overseas territories)[8], Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, the Slovak Republic, Slovenia and Spain. Furthermore, the euro is used as legal tender in four European micro-states and three additional French overseas territories.[9] The same is true of Montenegro and Kosovo, which have opted for unilateral euroisation. In return for adopting the euro, they have waived the right to issue their own currency without the Eurosystem having entered into any obligations with them.

ERM II members

ERM II currently comprises the three countries Denmark,[10] Latvia and Lithuania.[11] ERM II members have pegged their currencies to the euro. Their central banks, together with the Eurosystem, prevent the bilateral exchange rate of their currency against the euro from departing from a fixed band around the central rate by pursuing a stability-oriented monetary policy and – if necessary – by intervening on the foreign exchange market. For the Danish krone, this band is set at ± 2.25%; for the other currencies at ±15%. Both the Latvian and the Lithuanian authorities have committed unilaterally to a much stricter euro peg which places no additional obligations on the ECB. Thus Latvia ensures that the euro exchange rate does not fluctuate more than ±1% from the central rate. The Bank of Lithuania stabilises its central euro exchange rate by means of a currency board arrangement.

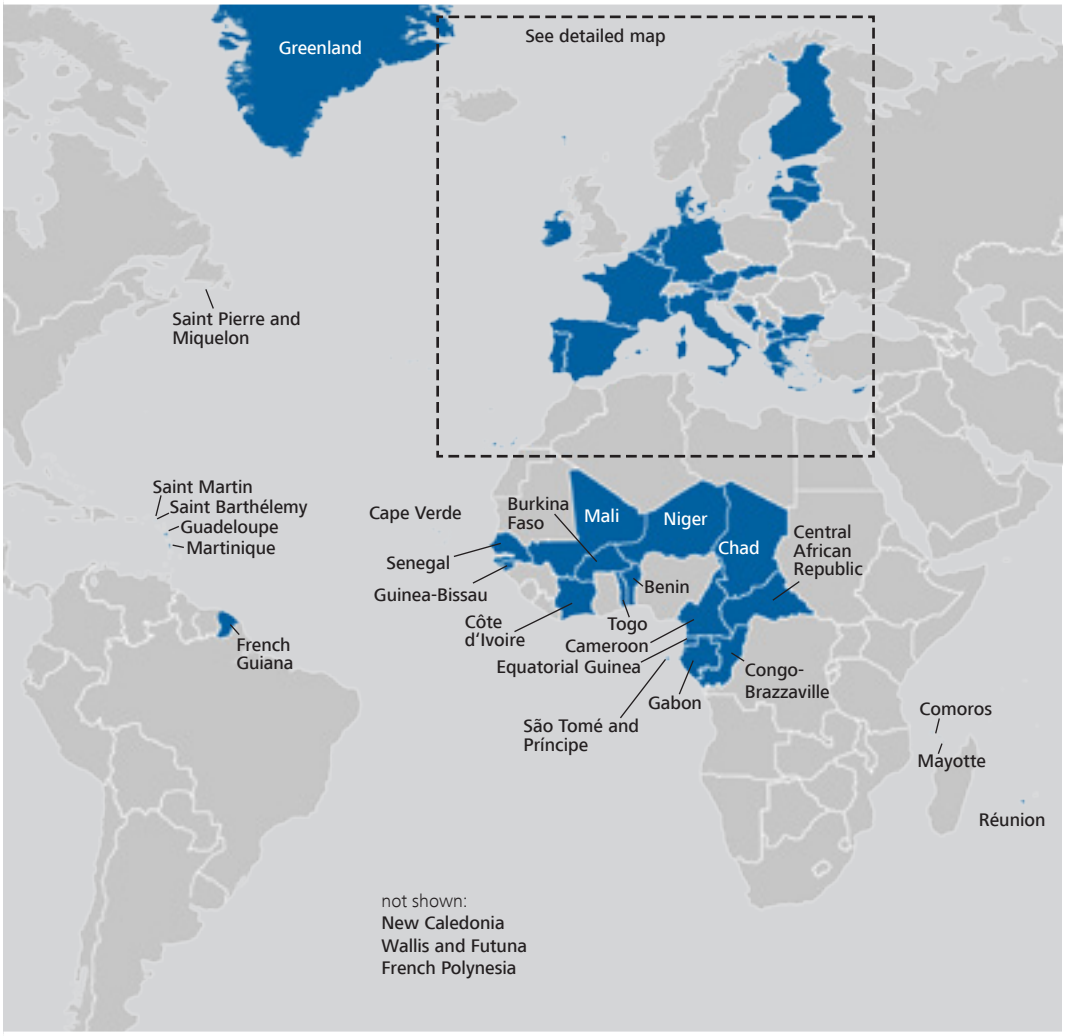
Other currencies pegged to the euro

Outside of ERM II, two other countries have pegged their currencies to the euro via a currency board arrangement: Bosnia and Herzegovina, and Bulgaria. A number of African states[12] as well as the French territories of the CFP franc zone[13] have pegged their currencies to the euro via conventional fixed exchange

5 See M W Klein and J C Shambaugh (2010), Exchange Rate Regimes in the Modern Era, MIT Press, Cambridge, Massachusetts.
6 See B Eichengreen (1994), International Monetary Arrangements for the 21st Century, Washington, DC, The Brookings Institution.
7 See J A Frankel (1999), No single currency regime is right for all countries or at all times, NBER Working Paper, No 7338.
8 French Guiana, Guadeloupe, Martinique, Mayotte, Réunion.
9 The former comprise Andorra, Monaco, San Marino and the Vatican City State; the latter Saint Barthélemy, Saint Martin as well as Saint Pierre and Miquelon. For information on the legal status of the euro in the various French overseas territories, see N de Sèze, A Marchand and R Bardy (2011), French overseas territories and the euro, Banque de France Quarterly Selection of Articles, No 24, pp 101-124.
10 As the Danish krone is legal tender in the Faroe Islands and Greenland, these territories also belong to the euro bloc.
11 ERM II is described in more detail in Deutsche Bundesbank (2008), European Economic and Monetary Union, Frankfurt am Main, pp 73-81.
12 This includes the following states that belong to the CFA franc zone: Benin, Burkina Faso, Cameroon, the Central African Republic, Chad, Congo-Brazzaville, Côte d'Ivoire, Equatorial Guinea, Gabon, Guinea-Bissau, Mali, Niger, Senegal and Togo as well as the following countries that do not belong to the CFA franc zone: Cape Verde, Comoros, and São Tomé and Príncipe.
13 The CFP franc zone comprises New Caledonia, French Polynesia, and Wallis and Futuna.

The euro bloc: countries and regions that use the euro as legal tender or have pegged their currency to it

As at end-April 2011



Sources: IMF, ECB and Deutsche Bundesbank, Exchange rate statistics. Basic map: www.kartenwelten.de.
Deutsche Bundesbank

rate systems. While the Former Yugoslav Republic of Macedonia formally lets its exchange rate float freely, in practice it is likewise pegged to the euro.

Special cases: Croatia and Switzerland

The monetary policy of two other countries is less stringently based on the euro, meaning that they cannot actually be included in the euro bloc and hence are not to be found on the maps shown.[14] For a time, Croatia stabilised its currency against the euro; however, in other phases, it also allowed a gradual shift in value. The IMF recently classified the Croatian exchange rate regime as a crawl-like arrangement.[15] At the start of September 2011, following a considerable appreciation of the Swiss franc in the wake of the debt crisis that befell certain euro-area countries and the resulting capital inflows into Switzerland, the Swiss National Bank set a minimum euro exchange rate for the Swiss franc and announced that it

14 The euro exchange rate also plays a certain role in the monetary policy of those countries that have pegged their currencies to a currency basket that includes the euro. As far as is known, this is true of all currency baskets currently in use, with the exception of Tonga. As the monetary policy of these countries is also influenced by exchange rates against currencies other than the euro, they cannot be assigned to any currency bloc. Countries in this group are listed in ECB, The International Role of the Euro, July 2011, p 16.
15 See IMF, op cit, p 740.

The euro bloc: countries and regions that use the euro as legal tender or have pegged their currency to it; detailed map of Europe

As at end-April 2011

Sources: IMF, ECB and Deutsche Bundesbank, Exchange rate statistics. Basic map: www.kartenwelten.de
Deutsche Bundesbank

would buy unlimited amounts of foreign currency to defend it. So far in 2012, the exchange rate has always been close to this floor. The euro reference exchange rate published by the ECB has remained between the minimum exchange rate of CHF 1.20 and CHF 1.22.

The euro bloc …

The euro bloc as defined above comprises 59 countries and regions. Its economic focus is in Europe but it also includes, above all in Africa, a number of states and areas that, until the second half of the twentieth century, were or still are politically dependent on what are now euro-area countries or on Denmark. In 2010, the euro bloc earned one-fifth of global value added or, in terms of purchasing power parities, one-sixth.[16]

Besides the euro, the US dollar notably plays a key role as an anchor currency.[17] Using a similar

16 Bundesbank calculations based on WDI data from the World Bank.

17 All other currencies are currently insignificant as an anchor currency. The pound sterling is used as an anchor currency in a number of dependent territories of the United Kingdom; the New Zealand dollar is used on Pacific islands that are dependent on New Zealand; the Australian dollar is used in three small Pacific states; the South African rand is used in the neighbouring countries of Namibia, Swaziland and Lesotho; the Indian rupee is used in Nepal and Bhutan; the Singapore dollar is used in Brunei; and the Swiss franc is used in Liechtenstein.

Exchange rate of the euro against the Swiss franc

EUR 1 = CHF …; daily data, log scale

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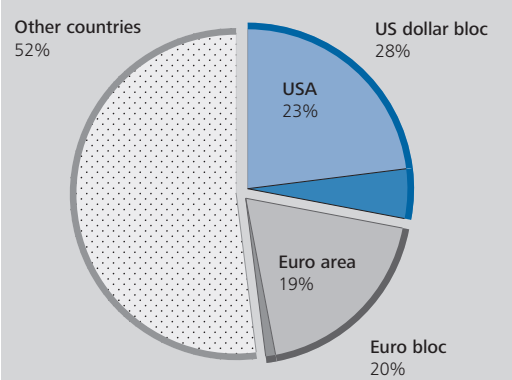
Exchange rate of the euro against the kuna (Croatia)

EUR 1 = HRK …; daily data, log scale

Deutsche Bundesbank

Shares of the two major currency blocs in global value added



Source: Bundesbank calculations based on World Bank data (WDI).

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… compared with the US dollar bloc

definition as that applied to the euro bloc, the US dollar bloc comprised 63 countries and regions at the end of April 2011.[18] Although this is a similar number to that of the euro bloc, the aggregate gross domestic product (GDP) of the US dollar bloc was one-third larger (one-half larger measured by purchasing power parities). When making such comparisons, it should be borne in mind, first, that the economic output of the US dollar bloc is generated to a large extent by one country alone, namely the United States, whose GDP on its own exceeds that of the euro bloc. Although the euro area similarly dominates the euro bloc economically, it differs markedly in that it comprises 17 sovereign states. Second, the definition of the currency blocs can have a notable impact on such a comparison. In the case of the US dollar bloc this is particularly true of China, whose currency system, following the renminbi's gradual appreciation against the US dollar, is now no longer classified as being pegged to the US dollar, as it was in prior years. If it included China, the US dollar bloc's GDP would have been much larger still.

Similarities and differences in the geographical composition

A comparison of the geographical composition of the two currency blocs initially reveals similarities. Thus like the euro, the US dollar is used extensively as an anchor currency on a regional basis, chiefly by a number of West Indian islands and in Central America. Unlike the euro, however, the US dollar is also used globally as an anchor currency by many oil-exporting countries, presumably because oil prices are quoted in US dollars. This is especially true of the Middle East and Central Asia. But a number of other countries around the world also peg their currency to the US dollar, such as the countries of Indochina (Vietnam, Laos, Cambodia) and Ukraine, which is currently the only European country to do so.

18 The definition is chiefly based on the IMF's de facto classification of currency regimes mentioned above, op cit. Countries whose currency falls into one of the categories listed in footnote 4 as qualifying as a fixed exchange rate regime are assigned to a currency bloc. The euro-area countries are naturally classified as part of the euro bloc.

Composition of the euro bloc comparatively stable

A longitudinal study for the period since 1999 shows that the composition of the euro bloc has remained exceptionally stable when compared with the US dollar bloc. Based on the IMF's *de facto* classification, only Hungary and Croatia have loosened their currency's temporary peg to the euro since the launch of monetary union. By contrast, the degree of currency fluctuation of the countries belonging to the US dollar bloc was much more pronounced. However, this by no means implies that the US dollar has since become less important as an anchor currency. In actual fact, more currencies were newly pegged to the dollar in this period than were made more flexible.

Criteria for choosing the exchange rate regime

Benefits of monetary integration, especially elimination of exchange rate uncertainty and transaction costs, …

The academic literature began back in the 1960s to identify the conditions under which a fixed exchange rate regime is particularly beneficial. Its pioneers were Mundell, McKinnon and Kenen.[19] Their theory of optimum currency areas compares the costs and benefits of monetary integration in relation to structural features of the participating economies. The principal benefit of monetary integration is that it eliminates exchange rate uncertainty and the transaction costs that are incurred when exchanging currency, hedging exchange rate risks and procuring information about future exchange rate developments.

… but also costs of losing option of exchange rate adjustment, …

Unlike the benefits, which do not fully unfold until a single currency has been introduced, the costs of monetary integration are also incurred if the respective national currencies are maintained and their exchange rates are fixed. The costs stem from the fact that the option of adjusting exchange rates is no longer available as an instrument to overcome external macroeconomic disruptions. This can be particularly problematic if the countries concerned are affected by these disruptions to varying degrees. The size of the costs from these asymmetrically distributed shocks depends on the availability of alternative adjustment mechanisms.

… which depend on the degree of price flexibility and factor mobility, …

Countries with a fixed exchange rate regime or in a currency union whose levels of price competitiveness differ no longer have the option of counteracting any resulting real economic imbalance by adjusting the nominal exchange rate as this cannot be done without abandoning the exchange rate target or the single currency. However, instead of varying the nominal exchange rate, a country's price competitiveness can generally also be brought into line by adjusting wages and product prices. But this requires a relatively high degree of wage and price flexibility to enable the adjustment process to take effect quickly enough. Alternatively, such regional imbalances can also be rectified by means of a cross-border migration of production factors, especially workers. Overall, countries with flexible labour markets and highly mobile production factors are better able to cope without exchange rate adjustment and are thus better suited to adopting fixed exchange rate arrangements.

… and the size and openness of an economy …

In a small, open economy, the development of domestic prices and costs is highly dependent on the exchange rate; hence the exchange rate instrument has only a limited effect on changing the relative prices of domestic and foreign goods. For instance, a nominal devaluation of the domestic currency often results in a corresponding increase in domestic costs and prices, which weakens the effects of the nominal exchange rate variation on cross-border relative prices. The theory of optimum currency areas thus suggests that fixed exchange rates are

19 See R A Mundell (1961), A theory of optimum currency areas, American Economic Review 51, pp 657 -665; R I McKinnon (1963), Optimum currency areas, American Economic Review 53, pp 717 -725; P B Kenen (1969), The theory of optimum currency areas: an eclectic view, in R A Mundell and A K Swoboda (eds), Monetary Problems of the International Economy, Chicago, University of Chicago Press, pp 41-60.

suited rather to very open economies.[20] In actual practice, where several currencies could, in principle, be considered as an anchor, this argument implies that the currency best suited to be a country's anchor currency is that of the currency bloc with which the country has close trade ties. In addition, given small economies' relatively shallow and narrow financial markets, larger cross-border capital flows could lead to volatile exchange rate swings. This is another reason in favour of fixed exchange rates.

… as well as the economy's degree of diversification, …

Economies that are strongly diversified and, at the same time, have high factor mobility can adjust relatively easily and are relatively well placed to absorb sector-specific shocks through production shifts within the internal economy. Asymmetric shocks thus affect only economic sectors inside the country in question and do not necessarily result in an external imbalance that would require the exchange rate to be adjusted. Thus the need for exchange rate flexibility tends to fall with an economy's rising level of diversification.

… and the symmetry of economic structures and the homogeneity of preferences

If economic agents' behaviour or their economic policy preferences are heterogeneous, symmetric shocks can likewise result in asymmetric increases in wages and prices. For instance, weak cross-border demand can mean that wage restraint is more pronounced in one country than in others. This could be counterbalanced by adjusting the exchange rate. A similar case arises if different inflation rates are targeted owing to heterogeneous inflation preferences. It follows that fixed exchange rates require the countries in question to have similar economic structures and preferences.

An empirical study into the choice of the euro as legal tender or anchor currency

Empirical study

An empirical study examined the fundamental structural determinants of choosing the euro as the legal tender or anchor currency.[21] This analysis methodologically determined the probability of each country and dependent territory belonging to the euro bloc (as defined above), the US dollar bloc or neither of these blocs.[22] No distinction was made as to whether a country is a member of the euro area, has unilaterally opted for euroisation or has conventionally pegged its currency to the euro.

Determinants according to the theory of optimum currency areas

This is because variables from the above-mentioned theory of optimum currency areas were used as determinants, which, in turn, have a bearing on all intensities of currency pegging. The importance of these criteria for the choice of exchange rate regime has been examined and confirmed in many studies.[23] However, the concrete choice of anchor currency, which is the focal point of the Bundesbank discussion paper cited, has mostly been disregarded in the literature to date.[24]

Flexible versus fixed exchange rates

The estimations described in the study find that a country with a large real GDP is relatively unlikely to peg its currency to the euro or another currency. Smaller economies are usually more dependent on cross-border trade, which generally entails a higher degree of openness. In comparative terms, they also have fewer options for pursuing an independent monetary policy, meaning that the opportunity cost of a fixed exchange rate is low. By contrast, the

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20 According to F Breedon, T G Pétursson and A K Rose (2012), Exchange rate policy in small rich economies, Open Economies Review 23, pp 421-445, flexible exchange rates in small, rich economies give rise to increasing exchange rate volatility without being able, as an adjustment instrument, to significantly lower the volatility of real economic variables.
21 See C Fischer, Currency blocs in the 21st century, Discussion Paper, Deutsche Bundesbank Research Centre, Series 1, No 12/2011.
22 For details of the estimation approach, see the box on pp 24-25.
23 For instance, E Levy-Yeyati, F Sturzenegger and I Reggio (2010), On the endogeneity of exchange rate regimes, European Economic Review 54, pp 659-677, showed that only criteria resulting from the theory of optimum currency areas are relevant for the choice of exchange rate regime for both industrial and other countries.
24 One exception is C M Meissner and N Oomes (2009), Why do countries peg the way they peg? The determinants of anchor currency choice, Journal of International Money and Finance 28, pp 522-547, which, however, examines historical periods in which the euro had not yet been introduced.

study found that a country's greater relative wealth measured in terms of *per capita* GDP raises the probability of adopting a fixed exchange rate regime.[25]

Determinants of euro bloc membership

The likelihood that a country belongs to the euro bloc grows with the extent of its trade ties to (other) euro bloc countries. This does not mean just its trade ties to the euro area itself but also to other countries that have pegged their currency to the euro. A shorter geographical distance between the country in question and the monetary policy centre of the euro area (Frankfurt am Main) proved to be another key fundamental indicator of a higher likelihood of its membership of the euro bloc. Relative geographical proximity, in turn, can be expected to imply relatively high factor mobility plus a higher correlation of economic cycles and consumption habits. Furthermore, the estimation shows that many of the countries that were dependent at least into the 1960s on one of the current members of the euro bloc likewise use the euro as an anchor currency.[26]

Comparison with the US dollar bloc

Comparing these results with those for the US dollar bloc, it likewise turns out that a country with a relatively close trade focus on countries and regions belonging to the (rest of the) US dollar bloc is more likely to belong to the bloc itself. However, unlike the euro bloc, the geographical distance to the US monetary policy centre has no significant impact on whether the US dollar is adopted as an anchor currency. A detailed analysis shows, however, that this applies solely to a group of countries that peg the exchange rate of their currency to the US dollar only temporarily. For countries with a permanent peg to the US dollar, geographical proximity to the United States plays a similarly important role as for countries in the euro bloc. The existence of a group of countries that use the US dollar as an anchor currency at times although most of them are fairly remote from the USA distinguishes the US dollar bloc from the euro bloc. With regard to this group of countries – but only this group of countries – the US dollar can be termed a global anchor currency and the euro more as a regional one.

One last variable that was examined in terms of its impact on the choice of anchor currency is the share of oil exports in total exports. As crude oil is traded in US dollars internationally, it may be presumed that oil-exporting countries prefer to peg their currency to the US dollar so as to stabilise the domestic value of their oil export revenues. While the estimation does in fact show that such a connection exists, it turns out to be barely statistically significant.

Euro area an optimum currency area?

As the study examines the extent to which each country's economic structure points to the likelihood of a euro peg, a US dollar peg or a flexible exchange rate regime, the underlying model can also indicate whether there are viable alternatives to the regime actually adopted. In view of the recent dislocations affecting parts of the euro area, such possible alternatives have recently been mooted for individual euro-area member states. However, the relevant academic literature on the optimality of a single currency area in Europe dates back to the early 1990s.[27] Such literature usually focuses on using just one criterion from the theory of optimum currency areas to examine whether the conditions in European countries, for instance, compared with those in other large currency areas such as the USA favour a monetary union. This was confirmed for some criteria (for instance, for the degree of openness and the diversification of production and consumption) but not for others (including

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25 This finding, which was already current in the literature, is in line with the above-mentioned classical theory of optimum currency areas insofar as production and consumption structures in richer countries are generally relatively diverse. See, for example, M W Klein and J C Shambaugh, op cit.

26 In the literature, this finding is justified inter alia by the hypothesis that former colonial powers continue to provide financial support to their ex-colonies and in this way help to smooth cyclical fluctuations. See M W Klein and J C Shambaugh, op cit.

27 See, for example, P de Grauwe (2009), The Economics of Monetary Union, Oxford, Oxford University Press, 8th edition; the first edition was published back in 1992 under the title "The economics of monetary integration".

An estimation approach to determining the probability of joining a currency bloc

A country's choice of exchange rate regime is determined by a number of political and economic factors. Using econometric estimations it is possible to calculate the probability that a country will use the euro or US dollar as its legal tender or anchor currency.[1] To this end, each country's exchange rate regime is assigned to one of the following four rough categories: euro as legal tender or anchor currency (regime 1), US dollar as legal tender or anchor currency (regime 2), pegging to a third currency or a currency basket (regime 3), and floating exchange rates or hybrid system (regime 4). The choice of one of the aforementioned regimes involves decision-making at two different levels. First, the country must choose the type of exchange rate regime (fixed or floating exchange rates). If it opts for a fixed exchange rate regime (and only in such cases), it then has to select an anchor currency. The "nested logit" approach represents a suitable method for estimating such a hierarchically structured decision-making process.

When applying this approach, it is first of all necessary to distinguish between the probability p that a country i will opt for a fixed exchange rate regime P, p_{iP}, and the probability that it will select a regime based on floating exchange rates F, $p_{iF} = 1 - p_{iP}$,. If the country in question opts for a fixed exchange rate regime, it is then possible to define the (conditional) probabilities $p_{i1|P}$ (euro), $p_{i2|P}$ (US dollar) and $p_{i3|P} = 1 - p_{i1|P} - p_{i2|P}$ (another currency), depending on the anchor currency used. Using a nested logit approach, the following (unconditional) probabilities for the four regimes, p_{i1}, p_{i2}, p_{i3} and p_{i4}, described above are:

$$p_{i1} = p_{iP} \times p_{i1|P} = \frac{\exp(\mathbf{z}'\boldsymbol{\alpha} + \tau \cdot I)}{1 + \exp(\mathbf{z}'\boldsymbol{\alpha} + \tau \cdot I)} \cdot \frac{\exp\left(\mathbf{x}_1'\boldsymbol{\beta}_1 / \tau\right)}{\exp(I)} \quad (1)$$

$$p_{i2} = p_{iP} \times p_{i2|P} = \frac{\exp(\mathbf{z}'\boldsymbol{\alpha} + \tau \cdot I)}{1 + \exp(\mathbf{z}'\boldsymbol{\alpha} + \tau \cdot I)} \cdot \frac{\exp\left(\mathbf{x}_2'\boldsymbol{\beta}_2 / \tau\right)}{\exp(I)} \quad (2)$$

$$p_{i3} = p_{iP} \times p_{i3|P} = \frac{\exp(\mathbf{z}'\boldsymbol{\alpha} + \tau \cdot I)}{1 + \exp(\mathbf{z}'\boldsymbol{\alpha} + \tau \cdot I)} \cdot \frac{1}{\exp(I)} \quad (3)$$

$$p_{i4} = p_{iF} = \frac{1}{1 + \exp(\mathbf{z}'\boldsymbol{\alpha} + \tau \cdot I)} . \quad (4)$$

In these equations, $\mathbf{z}$ denotes a vector of determinants for the first decision level, ie the choice between a fixed exchange rate regime and one based on floating exchange rates, $\mathbf{x_1}$ ($\mathbf{x_2}$) a vector of variables that determine the choice of the euro (US dollar) as the anchor currency, and $\boldsymbol{\alpha}$, $\boldsymbol{\beta_1}$ and $\boldsymbol{\beta_2}$ the corresponding coefficient vectors.[2] The explanatory variables used for the estimation are derived directly or indirectly from the optimum currency area theory described in the main text. Vector $\mathbf{z}$ contains the logarithmic real GDP of country i and its logarithmic *per capita* real GDP, vector $\mathbf{x_1}$ a measure of the trade integration of country i with (other) euro bloc countries, the distance of that country's capital city from the monetary policy-making hub of the euro bloc, Frankfurt am Main, and a dummy variable which assumes the value of one if the country in question was dependent on one of the countries belonging to today's euro bloc up to the 1960s or still is dependent. Similarly, vector $\mathbf{x_2}$ comprises a measure of the level of trade integration with the (other) countries in the US dollar bloc and the country's distance from Washington, DC. The share of net oil exports in the total

1 See C Fischer, 2011, Currency blocs in the 21st century, Discussion Paper, Deutsche Bundesbank Research Centre, Series 1, No 12/2011.
2 The Greek letter τ denotes a further parameter that needs to be estimated, and I a term comprising variables and coefficients.

exports of the country in question is factored into both $\mathbf{x_1}$ and $\mathbf{x_2}$.

Using a maximum likelihood approach, the econometric model can be estimated either in cross-sectional analyses for several different years or, alternatively, by pooling all the data of the entire period. These estimations generally deliver statistically significant coefficients for all the variables, except for oil exports as a share of total exports and distance from Washington, DC. Since the nested logit model is non-linear, it is easier to interpret a table showing the average marginal impacts than one detailing the coefficients. For each explanatory variable, the adjacent table shows the marginal impact of its variation on the probability of opting for a given regime or anchor currency. Since, in a non-linear model, the size of this impact differs for each observation, in this case for each country and each year, an average value is given.

Estimated average marginal impact on the probability of a given regime choice

in percentage points (pp)
based on a pooled estimation for the period 1999-2008

Explanatory variables	Peg to the euro	Peg to the US dollar	Peg to another currency	Floating exchange rate regime
Real GDP *(1% increase)*	– 2.40	– 3.01	– 1.02	6.43
Per capita real GDP *(1% increase)*	6.00	7.52	2.56	– 16.08
Distance from Frankfurt am Main *(1% increase)*	– 2.42	0.73	0.49	1.20
Distance from Washington, DC *(1% increase)*	0.09	– 0.45	0.18	0.18
Share of net oil exports in total exports *(increase of 1 pp)*	– 0.08	0.07	0	0.02
Share of trade with euro bloc in total trade *(increase of 1pp)*	0.51	– 0.16	– 0.10	– 0.25
Share of trade with US dollar bloc in total trade *(increase of 1 pp)*	– 0.08	0.41	– 0.16	– 0.17
(Former) dependent territory *("Yes" rather than "No")*	33.68	– 12.13	– 5.19	– 16.35

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The table reveals that the signs of the estimated average marginal impacts all correspond to the theoretical expectations. For instance, a 1 percentage point increase in a country's share of trade with (other) euro bloc countries increases the probability that the country in question is itself a member of that bloc by ½ percentage point, whereas the likelihood of this being the case for each of the three other regimes decreases. Similarly, a high share of trade with (other) US dollar bloc countries boosts that country's probability of joining the dollar bloc. If a given country's capital city is located 1% further away from Frankfurt am Main, then the chances of that country being pegged to the euro decline by just under 2½%, whereas the odds increase for the other regimes. The impact of a country's distance from Washington, DC, along with that of oil exports as a share of total trade, turn out to be small. Moreover, the likelihood of a given country having a fixed exchange rate regime rises with greater *per capita* GDP and with smaller real GDP. Last but not least, the probability of a country belonging to the euro bloc increases by more than 33 percentage points if an otherwise identical country once was or still is dependent on a (former) European colonial power.

price and wage flexibility as well as labour market integration).[28]

Economic structure of all member states compatible with monetary union, …

On the basis of the model presented here and considering the impact of all the criteria contained therein, it is also possible to determine whether a different monetary system from the one currently in place would be preferable.[29] It transpires that this is not the case for any of the countries that currently belong to the euro area. However, the robustness of these findings needs qualifying because fundamental structural suitability alone cannot guarantee problem-free membership of a monetary union; other factors are required, such as responsible economic and fiscal policies that take sufficient account of the demands of a single currency and a single monetary policy in the euro area. This is the only way to secure the imperative requirement of avoiding excessive tensions in the single currency area.

… but membership requires responsible economic and fiscal policies

Findings for non-euro-area countries

As for the euro-area countries, the findings for all other European countries and almost all other non-euro-area countries in the euro bloc indicate that more flexible exchange rate arrangements would not significantly better fit their economic structure. By contrast, the estimations for a number of European states whose currency is currently not pegged to the euro suggest that their economic structure implies that it would make sense to fix their exchange rate against the euro. Of the European Union countries, this particularly applies to the Czech Republic but also Sweden. Outside of the European Union, this is especially the case for Switzerland, Iceland, Croatia and Albania.

Simplified modelling of regime choice approach

A caveat applying to all these findings is that they are based on a relatively simple approach which can by no means take account of all aspects of regime choice. For instance, expectations about the internal and external stability of a currency also play a role when deciding whether to adopt it as an anchor. Persistent failure to achieve the price stability target would considerably lessen the attractiveness of an anchor currency.[30] Another key consideration is the economic policy consequences of anchor intensity, which the estimation did not differentiate. Defending conventional currency pegs has proved, at times, to be difficult, especially during crises featuring large inward and outward capital movements. Finally, in many cases the choice of exchange rate regime involves political decisions, and these were likewise not captured by the model.

Summary

The euro is the central currency of a major currency bloc, currently comparable only with the US dollar. In addition to the euro-area countries, this currency bloc includes many other countries that use the euro as legal tender or that have pegged their own currency to it. An empirical study shows that membership of the euro bloc, irrespective of whether the country in question also belongs to the euro area, can be well explained by long-term variables of the country's economic structure. Besides fundamental structural suitability of the participating economies, persistently responsible wage and fiscal policies, in particular, are essential prerequisites for ongoing tension-free membership of a currency bloc. The current sovereign debt crisis in a number of euro-area countries, which was preceded by a phase of growing macroeconomic imbalances, has graphically underscored this.

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28 See, for example, F P Mongelli (2002), "New" views on the optimum currency area theory: What is EMU telling us?, ECB Working Paper, No 138.

29 For more details on the technical approach of this analysis, see the above-mentioned study.

30 However, it is virtually impossible to include this in an econometric estimation because anchor currencies have behaved in much the same way in this respect over the past few decades. See C M Meissner and N Oomes, op cit.