ELSEVIER

European Journal of Political Economy
Vol. 13 (1997) 665–689

European Journal of
POLITICAL
ECONOMY

Eurowinners and Eurolosers: The distribution of seigniorage wealth in EMU [1]

Hans-Werner Sinn *, Holger Feist

CES - Center for Economic Studies, University of Munich, Munich, Germany

Received 1 April 1997; accepted 1 June 1997

Abstract

The European Monetary Union (EMU) will involve socialization of the existing seigniorage wealth of the national central banks. This socialization will create windfall gains for countries with relatively low monetary bases such as France and the UK and it will be disadvantageous for countries like Germany, Austria, Spain or the Netherlands which will suffer per capita wealth losses of between 406 and 182 ecus. The paper quantifies the gains and losses in seigniorage wealth under alternative membership and bank regulation scenarios. © 1997 Elsevier Science B.V.

JEL classification: E58; F33; F42

Keywords: Central Banks; European Integration; European Monetary Union; Seigniorage

1. Introduction

The European Monetary Union (EMU) will, in all likelihood, bring growth and prosperity to the old continent. All countries joining the EMU will be winners, but

* Corresponding author. Center for Economic Studies, University of Munich, Schackstr. 4, 80539 Munich, Germany. E-mail: hans-werner.sinn@ces.vwl.uni-muenchen.de.

[1] This article contains results which can be used to make a case against the European Monetary Union (EMU). We wish to emphasize that our primary objectives concern the analytical questions which we address and not this debate per se. We gratefully acknowledge useful comments by Helge Berger, Michael Hoy and Nikolaus Läufer.

PII S0176-2680(97)00029-3

some will win more than others, because they will receive a better currency than the one they lose. A good currency is highly demanded as a medium of transactions and a store of value and its wide usage creates a substantial seigniorage wealth for the issuing country. With the introduction of the euro, national currencies will disappear and seigniorage wealth will be socialized. This paper calculates the distribution of gains and losses associated with this socialization.

At first sight, this analysis may not seem to promise important results, for, if the new central bank simply exchanged the old national currencies for euros, how could seigniorage be affected? The national central banks would continue to collect interest on their portfolios of private and government issued assets, and, at most, future increases in the stock of money could lead to seigniorage profits for the European Central Bank (ECB) which might then raise distributional concerns. However, the presumption underlying this reasoning is wrong. The ECB does not exchange new money for old and it does not make gifts. In a sense, it sells the national central banks the right to issue the new money in exchange for the interest revenue from an equivalent amount of assets that retain their value after the national currencies disappear. The national central banks will have to accept what is, in effect, a socialization of that part of their interest bearing assets that back their monetary bases and they will have to burn the national bank notes and melt the coins which the public returns to them in exchange for the euros.

It is true that the socialization is not a net loss for the member countries. After all, the member countries receive shares in the return generated by the assets that back the euro's monetary base. However, the share received by a particular country is determined by the share of equity capital it contributes to the ECB, and not by its share in the wealth transfer. The equity capital is a small initial endowment which the participating country is allowed to contribute and it is negligible compared to the value of the wealth transfer (less than 1% on average). The equity capital will be determined by the average of the country's population and GDP shares, and this average may of course be different from the share of the wealth transfer. The latter roughly equals the country's share in the joint monetary base, and it may be relatively large if this country's currency is used as an international transactions and reserve currency or if the country relies heavily on cash transactions. Countries whose share in the monetary base exceeds their GDP and population shares will lose seigniorage wealth, and countries with the opposite relationship between these values will gain such wealth.

Although negotiations about the distribution of seigniorage are now being carried out behind closed doors, the issue has thus far received hardly any public attention. We are only aware of two relevant publications. The first is an unsigned newspaper article in Central Banking, 1997 and the second is an article in an educational journal by Maennig and Hunger (1996). Apart from the fact that these articles are concerned with seigniorage flows rather than stocks, they differ from our study in two important respects.

The first article assumes that EMU socializes the national central bank's profits;

i.e. the difference between revenue and cost. However, this will certainly not be true, as the national central banks will not cease to exist. As these central banks perform very different functions in the various EU countries and are organized in different ways, the cost of operating them will continue to be covered nationally. The Maastricht treaty requires the socialization of the return to the assets that back a country's monetary base (articles 32.2 and 32.5 of the Protocol on the "Statute of the European System of Central Banks and the ECB"), but, except for an optional clause referring to the cost of issuing bank notes and to exceptional circumstances (article 32.4), there is no provision for socializing the cost of running the national central banks.

The second article defines seigniorage as the annual increment in the nominal stock of central bank money and analyzes how the so-defined seigniorage will be redistributed among the EMU countries. While this is a useful approach for understanding the socialization of future increases in seigniorage wealth, it completely overlooks the socialization of the initial seigniorage wealth (or the socialization of the future interest income generated by this wealth) which is brought about by the EMU. This, however, is the crucial policy issue. Many Europeans may find it appropriate in a currency union for the wealth gains, which the new money will itself be able to earn, to be distributed according to population and GDP figures. They may find socializing the existing wealth that has been accumulated by the national central banks since their foundation to be less appropriate.

Our study is concerned with the gains and losses resulting from the socialization of existing seigniorage wealth. We try to quantify these gains and losses under alternative membership scenarios, and we discuss the policy options for reducing the amount of wealth redistribution. The information we produce may be useful for the final negotiations about EMU and they may even serve for predicting which countries are likely to join the new currency union.

2. Monetary base, central bank wealth and seigniorage profits

From a pure accounting perspective, no one will gain or lose from the currency conversion, because all steps in the conversion process involve equivalent exchanges of assets. However, the accounting system is not well suited to describing the phenomenon of creating wealth through printing money. The problem is that it treats a central bank's outstanding currency as a liability even though this liability incurs no obligation to pay interest or principal to the public. It is one of the basic wisdoms of monetary theory that while central bank money is an asset for the private sector because it generates transactions and liquidity services, it is not a true liability for the central bank because, except for the negligible cost of printing the money, this bank incurs no other resource cost in producing it. A country's monetary base is not merely an accounting item that nets out with other items; it is

a genuine asset as true and real as this country's capital stock. The producer of this real asset is the central bank which sells it to the private sector in exchange for interest bearing financial assets, gold or international currency reserves. The monetary base therefore measures the central bank's wealth from money creation.

In issuing its money the central bank uses the private banking system as an intermediary. The banking system is allowed to add self-created bank money which is a close substitute for central bank money. If it does not carry interest or if it is not destroyed through competitive rent seeking in the banking industry, even this bank money can be seen as a real asset representing a net wealth of the economy [2], but of course this type of wealth is not subject to socialization within the EMU.

With the introduction of the EMU each member country will have to exchange its monetary base for euros, and the right to issue euros will come from the ECB in exchange for a claim on assets that keep their value after the conversion. The return on the interest bearing assets which lie in the coffers of the national central banks and which have been accumulated gradually in the process of money creation will have to be transferred to the ECB. It is true that this transfer does not exactly satisfy the legal conditions for a full transfer of ownership rights in the assets. However, articles 32.2 and 32.5 of the Protocol on the "Statute of the European System of Central Banks and the ECB" state clearly that the return on the assets that back a country's monetary base will be distributed among the national central banks according to their respective capital shares in the ECB, and it is also clear that these assets will be included in the consolidated balance sheet of the ECB. In economic terms, this is about the same as saying that the assets themselves will be transferred to the ECB. Effectively, the community of ECB member countries will inherit that part of the wealth of the national central banks which backs the outstanding stocks of central bank money.

Apart from speculative profits, the interest income that a national central bank earns on its assets is the source of the profit which is regularly transferred to the government sector and which helps finance the public budget. In future, this interest income will be distributed to the national governments according to a pattern different from the one which exists prior to monetary union. It is a matter of taste whether the redistribution effected through the euro is calculated in terms of this interest income or in terms of the assets generating it [3]. In principle, the two methods are equivalent since the value of the stock of central bank wealth equals the present value of the flow of returns it generates. In this paper we have chosen a stock rather than a flow approach to the seigniorage problem.

[2] For a discussion of alternative views of the role of bank money see Gurley and Shaw (1960) and Patinkin (1961).

[3] For a useful discussion of different measures of seigniorage and their application to EMU see Gros (1993).

It might be argued that the equivalence between the stock and flow approaches does not hold if some of the central bank assets do not generate interest income, and that a national central bank could avoid the conversion losses if it declared that its monetary base is backed by these assets. However, this argument neglects the fact that non-interest bearing assets are not very important in quantitative terms and that the ECB member countries will object to accounting tricks that deprive them of their claims to the asset returns. The argument also overlooks the non-pecuniary returns the ECB can obtain from assets such as gold or international currency reserves, and the fact that these returns will be socialized over the ECB member countries just like the pecuniary returns. When the ECB optimizes its portfolio, all assets generate the same sum of marginal pecuniary and non-pecuniary services, and thus the true present value of returns will always be equal to the market value of the assets held. Calculating seigniorage stocks rather than flows helps us to bypass these problems and prevents us from getting stuck in a complicated discussion of interest differentials, portfolio structures, and discounting procedures.

Our study is also not concerned with the actual flows of transfers among the national central banks once EMU begins. Predicting these flows would be very difficult since it is unclear where the assets backing the monetary base will be held in future. Given that all central banks are able to produce the same quality of money, it might well be the case that part of the Bundesbank's monetary base is replaced by increases in the Spanish base and that the Bundesbank's interest bearing assets are transferred accordingly. Given the sharing rule agreed on in the Maastricht treaty, this would have a big effect on the net flows of transfer payments between the central banks, but it would not affect the gains and losses calculated in this paper which are all measured relative to the situation without EMU.

Another problem which we disregard refers to potential differences between book and market values of gold and international currency reserves. Such differences involve an obvious redistribution at the expense of countries like Germany which use low book values for precautionary reasons. We assume that the national central banks will adjust their balance sheets to the true market values before they will join EMU. Germany, for example, is preparing a new law which allows the Bundesbank to abolish the so-called 'Niederstwertprinzip' before it joins EMU and gives its assets away.

Finally, we bypass the transitional problems addressed in Article 51 of the Protocol on the "Statue of the European System of Central Banks and the ECB". Article 51 states that in the first year after EMU is founded only 40% of the central bank asset returns must be socialized, but that within a period of 5 years this percentage will increase to 100%. In our study we try to predict the gains and losses in seigniorage wealth after the transition to a full socialization has been completed.

3. The distribution of seigniorage wealth before the EMU

It is a plausible assumption that the size of a country's monetary base is roughly proportional to the size of its economy measured in terms of the size of its population or GDP. Indeed this assumption was made by the fathers of the Maastricht treaty who selected these variables as criteria for distributing the seigniorage profit among the EMU countries. However, even without going into the details of a GDP or population comparison, Fig. 1 reveals very clearly how utterly wrong this assumption is. The figure refers to all countries of the European Union and shows the magnitudes of the respective monetary bases [4].

The monetary bases can roughly be equated to the respective values of seigniorage wealth. Differences result, however, from the fact that Greece, Italy, Ireland and the Netherlands pay interest on the minimum reserves held by the private banking system. In addition, most central banks issue interest-bearing liquidity bills which are included in the definition of the monetary base. As the interest bearing part of a country's monetary base is not part of the seigniorage wealth, Fig. 1 distinguishes between monetary base and seigniorage wealth. According to article 32.4 of the Protocol on the "Statute of the European System of Central Banks and the ECB", it is the so-defined seigniorage wealth which is subject to socialization in EMU.

A priori, similar figures might have been expected for the four biggest West European countries, namely Germany, France, Italy and the UK. In fact, however, the values of the seigniorage wealth of France and the UK are surprisingly small. The joint seigniorage wealth of these two countries is about half that of Germany, which, in turn, is one third of the total. Spain, the EU's fifth biggest country has the second biggest seigniorage wealth with a slight margin over Italy. In per capita terms, the Spanish wealth is two thirds more than the French and twice as large as the British.

There are a number of explanations for the striking information revealed by Fig. 1. The following four points seem particularly important.

(i) The German figure is so high not only because Germany is the largest country, but also because the deutschmark is an important international transactions and reserve currency, taking second place to the dollar with a foreign circulation worth about 30–40 billion ecus [5]. The Turkish coffers said to be filled with DM 1000 bank notes provide anecdotal evidence for this phenomenon. The fall of the Iron Curtain and the traditional strength of the German export industries have both contributed to the dominant role of the deutschmark.

[4] All calculations are based on the most recent exchange rates available when this paper was written (April 1997). Since these exchange rates approximate the OECD PPP values rather well (see Sinn, 1997) they seem to be good predictors for those rates with which EMU will actually begin.

[5] See Seitz (1995), p. 54.

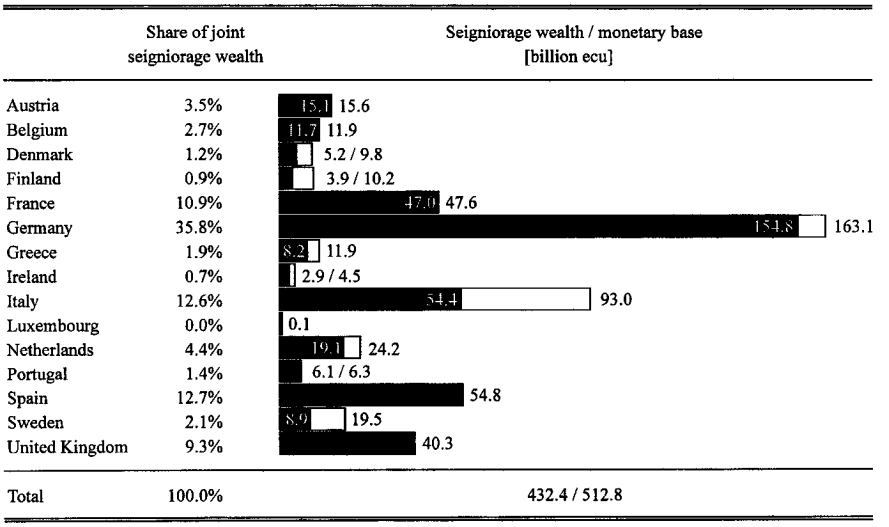

Fig. 1. Monetary base and seigniorage wealth before EMU. Notes: The monetary base consists of coins and bank notes as well as central bank reserves held by the private banking system. Seigniorage wealth equals the monetary base minus those private bank reserves on which central banks pay interest. The white parts of the columns indicate the interest bearing reserves. We used the monetary base at the end of 1995 and exchange rates of April 1997. Sources: International Monetary Fund, International Financial Statistics, March 1997; Annual Reports and Bulletins of National Central Banks; Frankfurter Allgemeine Zeitung No. 77, April 3, 1997, pp. 27 and 30; telephone interviews with representatives of the respective national banks.

(ii) The high figures for the Spanish and Italian monetary bases can probably not be explained along similar lines. A large fraction of black market activities is a more plausible candidate for an explanation, for such activities require cash rather than bank transfers. According to Schneider (1994), p. 199, the GDP share of black market activities is about 30% in Italy and 23% in Spain, while the figure for Germany is only 9.2%. The high Italian monetary base does not translate into a high level of seigniorage wealth since, as explained, Italy pays interest on the reserves of the private banking system.

(iii) The low figures for the UK and France can partly be attributed to the highly developed banking sectors and payment habits in these countries. The UK is the country of the credit card, and France is the country of the Minitel, a forerunner of the Internet connection which has made electronic banking a favourite pastime.

(iv) The figures for France and the UK are also low because these countries have comparably liberal banking laws. France imposes a minimum reserve requirement of between 0.5% and 1% on its banks, and the UK has no legal reserve

requirement at all [6]. Germany, on the other hand, from 1950 until March 1994 required that well over 10% of a bank's demand deposits be backed by central bank money. Only since the latter date have minimum reserve requirements been lowered considerably, and from August 1995 they are down to 2%. A more detailed discussion of this point will follow in Section 5.

All in all, these aspects are so different and idiosyncratic to the European countries that the divergence in the monetary base or seigniorage wealth figures shown in Fig. 1 ceases to be a miracle. The distribution of seigniorage wealth is extremely unequal, and major redistributive effects from socialization of this wealth are to be expected.

4. The gains and losses from an all-inclusive monetary union

The negotiators of the Maastricht treaty did not pay particular attention to the distribution of seigniorage wealth. Only one of the protocols [7] to this treaty contains information from which the distribution rule can be inferred. Basically, the member countries have to provide the ECB with a nucleus of equity capital and the profits of this bank will then be distributed among the member countries according to the equity shares. The crucial aspect is the calculation of the equity shares.

As mentioned above, a country's equity share is calculated as the average of its population and GDP shares. Initially, these will be derived from the population figures for the year 1997 and the average of the GDP figures for the years 1992–96. Later, the equity shares will be updated every 5 years according to the economic and demographic developments, where the capital contributions are adjusted accordingly. Table 1 exemplifies the calculation of the equity shares for the currently available economic and demographic data. Germany's share will be highest with a value of roughly 25%, and it will be followed by shares of 17% for France, 15% each for Italy and the UK, and 9% for Spain. By their very nature, these figures are very close to the prevailing capital shares of the European Monetary Institute, but they differ significantly from the percentages indicating the respective shares in the joint volume of seigniorage wealth which are reported in Fig. 1.

The total equity capital to be contributed will be 5 billion ecus, independent of how many countries participate. There are no direct distributional consequences with regard to this capital contribution because each country's share in the return

[6] Other countries which do not require minimum reserves include Belgium, Denmark and Sweden. See European Monetary Institute (1995) for a more detailed account.

[7] See articles 29, 32 and 33 of the Protocol on the "Statute of the European System of Central Banks and the ECB".

Table 1
The capital shares of the EMU countries

	Population (million people)	GDP (billion ecu)	Population (share in EU total)	GDP (share in EU total)	Capital share in ECB
Austria	8.0	161.1	2.16%	2.64%	2.40%
Belgium	10.1	188.0	2.73%	3.08%	2.90%
Denmark	5.2	120.1	1.40%	1.97%	1.70%
Finland	5.1	82.9	1.37%	1.36%	1.35%
France	57.9	1097.3	15.61%	17.97%	16.80%
Germany	81.4	1680.6	21.95%	27.52%	24.75%
Greece	10.4	81.6	2.81%	1.34%	2.05%
Ireland	3.6	42.8	0.96%	0.70%	0.85%
Italy	57.2	869.6	15.42%	14.24%	14.80%
Luxembourg	0.4	10.7	0.11%	0.18%	0.15%
Netherlands	15.4	275.9	4.15%	4.52%	4.35%
Portugal	9.9	69.9	2.67%	1.14%	1.90%
Spain	39.1	421.6	10.55%	6.90%	8.70%
Sweden	8.8	173.0	2.37%	2.83%	2.60%
UK	58.4	832.5	15.74%	13.63%	14.70%
EU total	371.0	6107.7	100.00%	100.00%	100.00%

The calculation follows article 29.1, Statute of the European System of Central Banks and the European Central Bank, where the population data refer to the year 1994 and the GDP data to the average of the years 1992–95. The figures for Luxembourg and Portugal refer to the period 1992–94. Sources: Statistisches Jahrbuch für das Ausland 1996, pp. 22–23; International Monetary Fund, International Financial Statistics, January 1997; OECD, National Accounts 1996, Main Aggregates, Volume 1, p. 65.

which this capital earns equals its share contributed. However, there are indirect distributional consequences insofar as the return to the other assets which are received in exchange for euros will also be distributed in proportion to the capital contribution. The capital share provides a claim not only on the capital contributed but also on the total stock of seigniorage wealth inherited by the ECB member countries.

If the allocation of seigniorage wealth across the European countries happened to be equal to the allocation of capital shares there would be no problem. Each unit of contributed capital would carry the same amount of seigniorage wealth and hence socialization of this seigniorage wealth among the capital units would be distributionally neutral. In fact, however, the capital units carry very different amounts of seigniorage wealth depending on where they come from.

Fig. 2 reveals the differences. The columns represent the positions of the single EU countries. The width of a column measures a country's capital share which, by assumption, can be taken as an indicator of this country's size as measured by the average of its population and GDP figures. The height of a column indicates the respective seigniorage wealth per unit of capital. The area covered by a column is

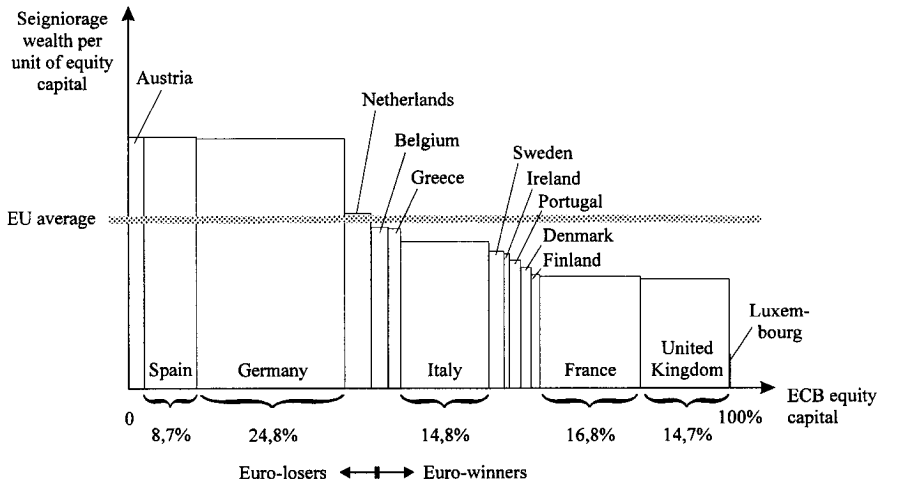

Fig. 2. Seigniorage wealth carried by a unit of equity capital. A Dalton's Parade of the member countries. The no-harmonization case. Sources: See Fig. 1 for monetary base and Table 1 for equity capital.

the total amount of seigniorage wealth contributed by a particular country. (It equals the length of the respective black column of Fig. 1.) The countries are ranked by the amount of seigniorage wealth per unit of capital so as to form a Dalton's Parade which indicates the attractiveness as a member of the currency union.

The leaders of the Dalton's Parade are Austria and Spain, followed by Germany and the Netherlands. The taillights of the parade are Luxembourg, the UK and France. These countries have so little central bank money or seigniorage wealth relative to their size that any other country which joins them in a monetary union will suffer a seigniorage loss.

If all EU members join the currency union, the horizontal gray line of Fig. 2 separates the winners from the losers. The height of the line indicates the average amount of seigniorage wealth per unit of capital and hence the amount which everyone would own after the socialization process of an exhaustive currency union. Obviously Luxembourg, the UK, France, Finland, Denmark, Portugal, Ireland, Sweden, and Italy would be the winners. The Netherlands, Belgium and Greece can relax, because they happen to hold more or less the average position. Austria, Spain and Germany would be the big losers.

Graphically, the magnitudes of the country-specific gains and losses can be found by measuring the areas between the columns and the horizontal line. For example, that part of the area of the German column that lies above this line is the German loss of seigniorage wealth, and the area below this line and above the French column measures the French gain of seigniorage wealth. By construction,

the sum of all such areas above the horizontal line equals the sum of the areas below it.

More accurate information on the magnitudes of the gains and losses from an all-inclusive currency union is provided by Table 2 which combines the information from Fig. 1 and Table 1. Table 2 confirms that France and the UK would be the two big winners of EMU with gains of 26 and 23 billion ecus, respectively. The sum of these gains would be enough to build another three tunnels underneath the Channel. Italy would be another big winner with 10 billion ecus. The biggest loser would be Germany with a loss of 48 billion ecus, followed by Spain with 17 and Austria with 5 billion ecus.

It is remarkable that Austria would be the third biggest loser from an exhaustive currency union, despite the fact that it is such a small country, hosting only 2.2% of the total EU population. A partial explanation is given by the last column of Table 2 which contains the gains and losses in per capita terms. This column shows that a typical Austrian is the largest loser from such a union with a loss of 591 ecus, equivalent to 8000 schillings. The losses imposed on other countries' citizens are also substantial. The average German loses 587 ecus or 1130

Table 2
Gains and losses from an all-inclusive monetary union — The no-harmonization case

	[1] Seigniorage wealth (billion ecu) B_i	[2] Share in seigniorage wealth $b_i = B_i / \Sigma B_i$	[3] Share in ECB equity capital k_i	[4] Total gains (billion ecu) $G_i = (k_i - b_i)\Sigma B_i$	[5] Gains per capita (ecu)
Austria	15.1	3.5%	2.4%	−4.7	−591
Belgium	11.7	2.7%	2.9%	+0.9	+84
Denmark	5.2	1.2%	1.7%	+2.2	+421
Finland	3.9	0.9%	1.4%	+2.0	+390
France	47.0	10.9%	16.8%	+25.6	+442
Germany	154.8	35.8%	24.8%	−47.8	−587
Greece	8.2	1.9%	2.1%	+0.7	+63
Ireland	2.9	0.7%	0.9%	+0.8	+226
Italy	54.4	12.6%	14.8%	+9.6	+168
Luxembourg	0.1	0.0%	0.2%	+0.5	+1,302
Netherlands	19.1	4.4%	4.4%	−0.3	−18
Portugal	6.1	1.4%	1.9%	+2.1	+215
Spain	54.8	12.7%	8.7%	−17.2	−438
Sweden	8.9	2.1%	2.6%	+2.3	+265
United Kingdom	40.3	9.3%	14.7%	+23.2	+398
Total	432.4	100.0%	100.0%	0.0	—

A country's gains or losses [4] are calculated by multiplying the difference between its capital [3] and monetary base [2] shares with the aggregate monetary base of all member states of the monetary union (sum over [1]).
Sources: See Fig. 1 for seigniorage wealth and Table 1 for equity capital.

deutschmarks, and the average Spaniard loses 438 ecus or 71 500 pesetas. Luxembourg's per capita gains are even larger than these figures. The average inhabitant of Luxembourg will experience a wealth increase of 1302 ecus or 51700 Luxembourg francs. A Frenchman gains 442 ecus or 2870 francs, and a citizen of the UK gains 398 ecus or 280 pounds. Obviously, these are large sums of money by any standard.

5. Harmonization of reserve requirements

A substantial part of the redistribution effects calculated above may have resulted from differences in banking regulations. The two biggest winners, France and the UK, impose no, or only small, reserve requirements, and the other countries have not harmonized their reserve-deposit ratios. Some countries, like Greece or Italy, impose high mandatory reserve-deposit ratios, but pay interest on the reserves. Fig. 3 correlates the actual interest free reserve-deposit ratios of the EU countries with the respective per capita seigniorage gains. The mechanism behind this highly significant negative correlation is obvious. If a country's reserve-deposit ratio is high, the scope for creating bank money is low and the country has a large monetary base relative to its size as reflected by its capital share in EMU. Thus the socialization of the assets backing the monetary base will

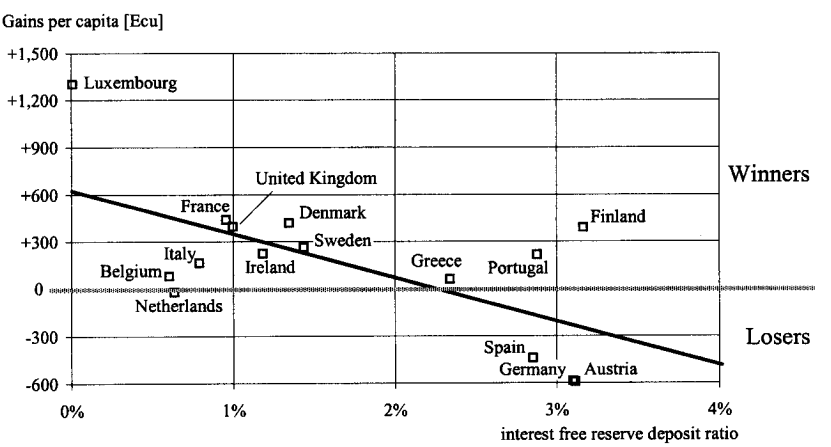

Fig. 3. Per capita seigniorage gains and banking regulation. Notes: The interest free reserve-deposit ratio is calculated by dividing non-interest bearing reserves, which private banks hold at the central bank, by deposits, which customers hold at the private banks. The trend line follows the regression equation $y = -625.27 - 27748x$ ($t = -3.05$) which is significant at a level of 99%. Gains per capita were calculated as described in Table 2, using data as stated in Fig. 1 and Table 1. Concerning reserves and deposits, we also used IMF data of 1995. The exchange rates for currency conversions are those of April 1997.

cause a loss for this country, and a gain for a country whose reserve-deposit ratio is low.

To counter a redistributive loss, a country with a high interest free reserve-deposit ratio could liberalize its banking regulations. The payment of interest on private bank reserves, or a reduction in the required reserve-deposit ratio which is accompanied by a contraction of the monetary base to eliminate the resulting excess reserves, would leave the overall M1 money supply constant and would privatize part of the seigniorage wealth, protecting it against socialization in the EMU. Indeed, much deregulation of this kind is likely to happen in a competitive environment where a single country determines its banking regulations independently of others aiming at maximizing national welfare. There would be a competition of laxity among the countries of Europe with an equilibrium in the neighbourhood of a zero interest free reserve-deposit ratio.

However, the equilibrium would not necessarily be a good one because there is much to be said in favour of substantial interest free reserve requirements. Reserve requirements stabilize the supply of money, because the deposit money banks need the central bank if they wish to enlarge their credit volumes. Without a minimum reserve requirement, the supply of deposit money could easily escape public control and create dangerous inflation and trade cycle risks. A minimum interest free reserve requirement may also serve as a tax on deposit money, which seems justified as the price for the right to create deposit money, and for the services which the central bank offers to the private banks.

In the light of this, harmonization of the mandatory interest free reserve-deposit ratios seems plausible. Harmonization would avoid the competition of laxity and eliminate one of the reasons for the redistribution of seigniorage wealth.

Table 3 compares the redistributive implications of alternative harmonization scenarios [8]. We distinguish between a high, a low, and a no, regulation scenario. In the high regulation scenario the actual interest free reserve-deposit ratio [9] is 4%, whereas in the low regulation scenario the actual interest free reserve-deposit ratio is 2%. In the no regulation scenario the ratio is zero, so that currency is the only source of central bank seigniorage wealth. This scenario is equivalent to one where there is a positive mandatory reserve-deposit ratio but where the ECB pays interest on all reserves. The no regulation scenario may also approximate the outcome of a competitive process where the national states chose their mandatory reserve-deposit ratios independently of one another.

Table 3 shows that harmonization of the reserve-deposit ratios will substantially

[8] It would be interesting to study the repercussions of these scenarios on the inflation rate in the EMU. See Sibert (1994) and Tori (1997) for theoretical discussions of the relationship between the distribution of seigniorage and the equilibrium inflation rate.

[9] In the discussion that follows we refer to actual rather than mandatory interest free reserve-deposit ratios, assuming that the preferred actual ratios can be achieved by a suitable choice of the mandatory ratios or other aspects of banking regulation.

Table 3
Seigniorage gains and losses under alternative harmonization scenarios

	Status quo			High reserve: 4%		Low reserve: 2%		No reserve	
	[1] Actual interest free reserve deposit ratio	[2] Seigniorage wealth (billion ecu)	[3] Gains (billion ecu) (ecu pc)	[4] Seigniorage wealth (billion ecu)	[5] Gains (billion ecu) (ecu pc)	[6] Seigniorage wealth (billion ecu)	[7] Gains (billion ecu) (ecu pc)	[8] Seigniorage wealth (billion ecu)	[9] Gains (billion ecu) (ecu pc)
Austria	3.1%	15.1	−4.7 −591	16.4	−3.6 −447	13.5	−2.7 −342	10.5	−1.9 −238
Belgium	0.6%	11.7	+0.9 +84	16.9	−1.3 −132	13.8	−0.9 −86	10.8	−0.4 −40
Denmark	1.3%	5.2	+2.2 +421	7.1	+2.0 +379	5.6	+1.9 +373	4.2	+1.9 +367
Finland	3.2%	3.9	+2.0 +390	4.3	+2.9 +576	3.2	+2.8 +550	2.2	+2.7 +524
France	1.0%	47.0	+25.6 +442	70.2	+19.8 +341	55.0	+20.0 +346	39.8	+20.3 +351
Germany	3.1%	154.8	−47.8 −587	163.9	−31.4 −386	143.6	−33.1 −406	123.3	−34.8 −427
Greece	2.3%	8.2	+0.7 +63	8.8	+2.2 +213	8.1	+1.1 +102	7.4	−0.1 −9
Ireland	1.2%	2.9	+0.8 +226	3.6	+1.0 +277	3.1	+0.7 +203	2.6	+0.5 +129

Italy	0.8%	54.4	+9.6 +168	70.1	+9.2 +160	60.3	+5.8 +101	50.6	+2.4 +41
Luxembourg	0.0%	0.1	+0.5 +1302	0.8	+0.0 +38	0.5	+0.2 +530	0.1	+0.4 +1,023
Netherlands	0.6%	19.1	−0.3 −18	26.8	−3.5 −230	22.2	−2.8 −182	17.6	−2.1 −135
Portugal	2.9%	6.1	+2.1 +215	6.8	+3.4 +344	5.6	+2.9 +295	4.3	+2.4 +247
Spain	2.9%	54.8	−17.2 −438	58.2	−11.6 −298	52.2	−13.4 −342	46.2	−15.1 −386
Sweden	1.4%	8.9	+2.3 +265	10.8	+3.1 +350	9.3	+2.3 +258	7.8	+1.5 +166
United Kingdom	1.0%	40.3	+23.2 +398	70.7	+8.0 +137	50.5	+15.2 +260	30.3	+22.3 +382
EU total	$\phi = 1.7\%$	$\Sigma = 432.4$	$\sigma = 16.7$ $\sigma = 471$	$\Sigma = 535.4$	$\sigma = 11.1$ $\sigma = 315$	$\Sigma = 446.5$	$\sigma = 11.9$ $\sigma = 314$	$\Sigma = 357.6$	$\sigma = 13.0$ $\sigma = 375$

The gains [3], [5], [7] and [9] were calculated as described in Table 2, using sources as stated below Fig. 1, Table 1 and Fig. 3. In each field, the upper figure is the total gain in billions of ecus, and the lower figure is the per capita gain in ecus.

Table 4
The distribution matrix (billion ecu/ecu per capita) — With a harmonized reserve-deposit ratio of 2%

Marginal gains received by ...	Marginal membership decision by...														
	AT	BE	DK	FI	FR	DE	GR	IE	IT	LU	NL	PT	ES	SE	UK
AT		+0.02	−0.05	−0.07	−0.58	+1.1	−0.03	−0.02	−0.16	−0.01	+0.07	−0.07	+0.35	−0.06	−0.43
		+3	−6	−8	−72	+131	−3	−2	−20	−1	+9	−9	+44	−7	−53
BE	+0.08		−0.06	−0.08	−0.70	+1.3	−0.03	−0.02	−0.20	−0.01	+0.08	−0.09	+0.42	−0.07	−0.52
	+8		−6	−8	−69	+126	−3	−2	−19	−1	+8	−9	+42	−7	−51
DK	+0.05	+0.02		−0.05	−0.41	+0.75	−0.02	−0.01	−0.12	−0.00	+0.05	−0.05	+0.25	−0.04	−0.30
	+9	+3		−9	−79	+144	−4	−2	−22	−1	+10	−10	+48	−8	−58
FI	+0.04	+0.01	−0.03		−0.33	+0.59	−0.01	−0.01	−0.09	−0.00	+0.04	−0.04	+0.20	−0.03	−0.24
	+7	+2	−5		−64	+117	−3	−2	−18	−1	+8	−8	+39	−6	−47
FR	+0.47	+0.15	−0.33	−0.48		+7.4	−0.18	−0.12	−1.1	−0.04	+0.49	−0.50	+2.5	−0.39	−3.0
	+8	+3	−6	−8		+128	−3	−2	−20	−1	+9	−9	+42	−7	−52
DE	+0.70	+0.22	−0.49	−0.70	−6.0		−0.27	−0.18	−1.7	−0.05	+0.73	−0.74	+3.6	−0.58	−4.4
	+9	+3	−6	−9	−73		−3	−2	−21	−1	+9	−9	+45	−7	−54
GR	+0.06	+0.02	−0.04	−0.06	−0.49	+0.90		−0.01	−0.14	−0.00	+0.06	−0.06	+0.30	−0.05	−0.36
	+6	+2	−4	−6	−47	+86		−1	−13	−0	+6	−6	+29	−5	−35
IE	+0.02	+0.01	−0.02	−0.02	−0.20	+0.37	−0.01		−0.06	−0.00	+0.02	−0.03	+0.12	−0.02	−0.15
	+7	+2	−5	−7	−57	+105	−3		−16	−1	+7	−7	+35	−6	−42
IT	+0.42	+0.13	−0.29	−0.42	−3.6	+6.5	−0.16	−0.11		−0.03	+0.43	−0.44	+2.2	−0.34	−2.6
	+7	+2	−5	−7	−62	+110	−3	−2		−1	+8	−8	+38	−6	−46

LU	+0.00	+0.00	−0.00	−0.00	−0.04	+0.07	−0.00	−0.00	−0.01		+0.00	−0.00	+0.02	−0.00	−0.03
	+10	+3	−7	−11	−89	+163	−4	−3	−25		+11	−11	+54	−9	−66
NL	+0.12	+0.04	−0.09	−0.12	−1.0	+1.9	−0.05	−0.03	−0.29	−0.01		−0.13	+0.64	−0.10	−0.77
	+8	+3	−6	−8	−68	+124	−3	−2	−19	−1		−8	+41	−7	−50
PT	+0.05	+0.02	−0.04	−0.05	−0.46	+0.84	−0.02	−0.01	−0.13	−0.00	+0.06		+0.28	−0.04	−0.34
	+5	+2	−4	−5	−46	+84	−2	−1	−13	−0	+6		+28	−4	−34
ES	+0.25	+0.08	−0.17	−0.25	−2.1	+3.8	−0.09	−0.06	−0.59	−0.02	+0.25	−0.26		−0.20	−1.5
	+6	+2	−4	−6	−54	+98	−2	−2	−15	−0	+7	−7		−5	−40
SE	+0.07	+0.02	−0.05	−0.07	−0.63	+1.1	−0.03	−0.02	−0.18	−0.01	+0.08	−0.08	+0.38		−0.46
	+8	+3	−6	−8	−71	+130	−3	−2	−20	−1	+9	−9	+43		−53
UK	+0.41	+0.13	−0.29	−0.42	−3.5	+6.5	−0.16	−0.11	−1.0	−0.03	+0.43	−0.44	+2.2	−0.34	
	+7	+2	−5	−7	−61	+111	−3	−2	−17	−1	+7	−8	+37	−6	
EU total	+2.7	+0.87	−1.9	−2.8	−20.0	+33.1	−1.1	−0.72	−5.8	−0.21	+2.8	−2.9	+13.4	−2.3	−15.2
EU ϕ	+8	+2	−5	−8	−64	+114	−3	−2	−18	−1	+8	−8	+40	−6	−49

A column shows how much alternative countries gain or lose if the country indicated at the top of the column is the last to join the monetary union. A row shows how much the country indicated at the left margin gains or loses if alternative countries join and complete the union. In each field, the upper figure is the total gain in billions of ecus, and the lower figure is the per capita gain in ecus. The gains are calculated as described in Table 2, and the data used are as stated in Fig. 1 and Table 1. The table refers to the low regulation scenario of Table 3.

reduce the redistribution of seigniorage wealth in EMU. In the low regulation scenario (2%), France would remain the largest winner, but its gain would be reduced from 25.6 to 20.0 billion ecus or 130 billion francs, British gains would be cut from 23.2 to 15.2 billion ecus or 11 billion pounds, which represents the largest negative swing of all countries. The Italian gain would fall from 9.6 to 5.8 billion ecus or 11 trillion lire. Harmonization would be good for Germany whose losses would decline from 47.8 to 33.1 billion ecus or 64 billion deutschmarks, and also for Austria, Finland, Greece, Portugal, Spain, and Sweden. Belgium would switch from being a winner to being a loser. The largest swings in per capita terms are experienced by Luxembourg and Austria. Harmonization of the reserve-deposit ratios would cost an inhabitant of Luxembourg 771 ecus or 28 250 Belgian francs, and an Austrian would gain 248 ecus or 3 360 schillings. Harmonization would cost a Belgian 170 ecus or 6 750 Belgian francs and a Dutch 164 ecus or 355 guilders. A Finn would enjoy a differential gain of 160 ecus or 918 finmarks, which is only mildly less than the German differential gain of 180 ecus or 347 deutschmarks.

In the high regulation scenario (4%), France would still be the largest winner with 19.8 billion ecus, and the United Kingdom would continue to keep the second position with 8.0 billion ecus. German losses would decrease slightly from 33.1 to 31.4 billion ecus.

In the no regulation scenario, with an interest free reserve-deposit ratio of zero, the United Kingdom would be the biggest winner of EMU with 22.3 billion ecus. The French gain would be a little smaller, and Italy's gain would be 2.4 billion ecus. Germany would lose 34.8 billion ecus, Spain 15.1 billion ecus. Recall that the no regulation scenario is equivalent to one with a mandatory reserve-deposit ratio where the central bank pays interest on the reserves.

All in all, there is no strong relationship between the level of the harmonized interest free reserve-deposit ratio and the amount of redistribution. A reduction in the harmonized reserve-deposit ratio will only modestly increase the standard deviations of the absolute and per capita gains (last line of Table 3). However, the harmonization as such will substantially reduce the amount of redistribution in seigniorage wealth. The standard deviation of absolute gains declines from 17 billion ecus to about 12 billion ecus in the low regulation scenario, and the standard deviation of per capita gains is cut drastically, from about 470 to 310 ecus.

6. Marginal gains and losses

Suppose a country is the last one to join an all inclusive EMU with harmonized banking regulations. Table 3 implicitly shows the marginal redistributive effect between this country and the sum of all other countries that results from this membership decision. What it does not show is how this effect breaks down to

marginal gains received by, and losses imposed on, other countries. What, for example, will Germany gain or lose if Britain joins the EMU?

The answer to this and similar questions is provided in the distribution matrix of Table 4, which refers to the low reserve scenario (2% reserve-deposit ratio) of Table 3. A column of Table 4 reveals the implications of a marginal membership decision of the country indicated at the top of the column on all other countries, and a row shows how much the country indicated at the left margin receives if alternative countries join and complete the union. Table 4 refers to both absolute and per capita gains. Germany's loss from Britain's joining the union, for example, is 4.4 billion ecus in absolute terms or 54 ecus for each German citizen. And if Spain joins the union, Germany will gain 3.6 billion ecus in total or 45 ecus per capita.

Looking at Table 4 by columns shows that the most expensive member of the union is France. If this country is the last to join the monetary union, all other countries lose 20.0 billion ecus which is 64 ecus for their average inhabitant. The per capita loss from a French membership would be highest for the inhabitants of Luxembourg with 89 ecus. Similarly, French membership costs a Danish citizen 79 ecus, a German one 73 ecus, and an Austrian one 72 ecus. As stated in the example above, the UK would be little cheaper, costing the average non-UK EU citizen 49 ecus.

Spain, on the other hand, would create windfall gains of 40 ecus for a typical citizen from other EU countries. The most beloved country should be Germany. It carries a gift of 114 ecus for each non-German EU citizen, or 33.1 billion ecus for all, of which 7.4 billion ecus would accrue to France, 6.5 each to Italy and the UK, and 3.8 to Spain.

Looking at Table 4 by rows gives the perspective of a single country which has to decide whether to vote for or against a particular other country joining the union. France, for example, would gain 2.5 billion ecus if Spain completed the union, and 500 million ecus if Austria or the Netherlands did so, but it would lose 3.0 billion ecus if the UK came in.

The distribution matrix was calculated under the assumption that the joining country completes the currency union. The marginal gains and losses resulting from this exercise are not identical with those marginal gains and losses that would result if one country were added to a smaller group of existing member countries. While it would be cumbersome to repeat the calculations for all feasible scenarios, the next section tries to shed some light on some plausible cases.

7. Alternative membership scenarios

At the time of writing, which countries will participate in the EMU is an open question, but it is very unlikely that all countries will join the union in 1999. After all, according to the Maastricht treaty, the currencies of joining countries must

have been within the normal margins of the exchange rate mechanism (ERM) for two years. This condition is not met by Greece, Sweden and the UK. There is also the barrier of the other criteria which have to be met before joining, including the two debt criteria. Except for Luxembourg, hardly any country will meet all these criteria, but article 104c of the Maastricht treaty allows substantial scope for interpretation which makes it unclear which countries will join and which will have to stay out.

Because of this uncertainty, this section considers the low regulation case with alternative membership scenarios among which there may be one which approximates the ultimate realization. To distinguish between these scenarios we have clustered the EU countries into five groups with similar membership conditions. The membership has to be decided with a qualified majority of 70% of the Council, which is 62 out of 87 votes. The votes commanded by the five groups are indicated in the top line of Table 5. Each of the five groups is too small to block EMU if it wished to do so, but any two of them would be sufficiently strong for that purpose. It is possible that only a minority of countries will participate in the union provided that a qualified majority agrees. The first of the five groups consists of Austria, Germany and the Netherlands, countries which have already been an extremely firm monetary coalition for many years. The second group includes Belgium, France and Luxembourg, the francophone bloc. The third group is a Mediterranean bloc with Italy, Spain and Portugal, and the fourth group consists of Denmark, Finland and Ireland. If this group joins, the European Monetary Union comprises all states which were EMS members during the two years preceding its foundation. The fifth group brings in Sweden, the UK and Greece, the three countries that cannot join in 1999 if the Maastricht treaty is respected.

If only the first group, the nucleus around Germany, forms the currency union, there is roughly a redistribution of 2.5 billion ecus from Germany to the Netherlands, while Austria will hardly be affected. This constellation is possible if the other countries agree to stay out, but this is not very plausible, to say the least.

A more plausible scenario is that the francophone group [2] will also join. France, after all, has been pushing harder than any other country for the monetary union. This will have dramatic consequences for seigniorage wealth. Germany now loses 23 billion ecus, and France gains 26 billion ecus. Part of the French gain will come from Austria which loses 1.8 billion ecus, and even the Netherlands will have to make a net contribution of 1.2 billion ecus. Belgium and Luxembourg will be among the winners. In per capita terms the gains and losses from such a union are truly large. A German inhabitant will lose 292 ecus or 562 deutschmarks, and a French one will gain 661 ecus or 4,287 francs. A citizen of Luxembourg will be subsidized with 669 ecus and a Belgian citizen with 22 ecus. It is tempting, though speculative, to believe that the francophone gains may have contributed to the French interest in a currency union with Germany.

There was a time when a small currency union consisting of the first two

groups seemed likely. This was the time when it seemed easy to satisfy the debt criteria strictly so that they could have been used to separate the 'good' countries from the 'bad' ones. In addition, the Scandinavian countries had strongly overvalued currencies and Italy seemed hopeless since it had been forced to leave the EMS and was miles away from meeting the deficit criterion. In the meantime all this has changed. The debt criteria will no longer be able to serve as a screening device since even Germany violates them and the Scandinavian countries have devalued, moving their currencies into the neighbourhood of the respective purchasing power parities [10]. Italy has joined the EMS in good time and is even trying to satisfy the deficit criterion by introducing special taxes in the examination year of 1997. Given these new developments, a more extended union is a plausible, if not a likely, possibility.

One extension beyond the Franco–Germanic bloc could be the inclusion of the Mediterranean countries, our group number [3]. This extension is problematic because of the high debt/GDP ratios which these countries have and because of the fact that their currencies are strongly undervalued when judged by the OECD PPP criterion. Still, given their strong preference for joining the EMU and given their voting power, it is not unlikely that they will be able to squeeze in. The three countries together have 23 votes in the Council of Ministers. It should not be difficult to log roll for the additional 3 votes which they need to block the union. For example, the five Greek votes or the three Danish votes would be enough to achieve this goal.

If the Mediterranean group joins, the French seigniorage gain will decrease by a billion ecus and the German loss will grow by 1.6 billion ecus. President Chirac and Chancellor Kohl will have to make up their minds whether their reluctant populations are ready to invite the inflation prone countries of southern Europe, given that they will have to pay for them as well.

However, the Mediterranean extension is not expensive. It costs only 3.2 billion ecus for the Franco–Germanic bloc. The reason is that the Spanish loss of 10.7 billion ecus will roughly compensate for the Italian gain of 10.3 billion ecus. Only Portugal's participation would involve a net loss for Franco–Germanic bloc.

A further extension could bring in Denmark, Finland and Ireland, group number [4]. This would form a monetary union from the former EMS countries. All three countries would gain by joining this union, and all incumbent countries would encounter seigniorage losses. While the gains of the new entrants would total 6.3 billion ecus, the French gain would decline from 25.3 to 23.9 billion ecus, and the German loss would rise from 25.4 to 27.4 billion ecus.

A final extension would involve the UK, Sweden and Greece. As explained above this is unlikely to come about in 1999, but it could well happen with a delay of a few years. If it happens, the distribution of gains and losses will be the one

[10] See Sinn (1997).

Table 5
Gains and losses under alternative membership scenarios (billion ecu/ecu per capita) — With a harmonized reserve-deposit ratio of 2%

	Scenarios, countries and votes (87)									
	[1] Monetary core (AT, DE, NL) 19		[2] + Francophone (+ BE, FR, LU) 17		[3] + 'Club Med' (+ IT, PT, ES) 23		[4] all EMS members (+ DK, Fl, IE) 9		[5] all EU members (+ GR, SE, UK) 19	
	Total gains	Per capita gains	Total gains	Per capita gains	Total gains	Per capita gains	Total gains	Per capita gains	Total gains	Per capita gains
Austria	+0.2	+24	−1.8	−230	−2.0	−249	−2.2	−274	−2.7	−342
Belgium	–	–	+0.2	+22	+0.0	+4	−0.2	−20	−0.9	−86
Denmark	–	–					+2.3	+448	+1.9	+373
Finland	–	–	–	–	–	–	+3.1	+611	+2.8	+550
France	–	–	+26.3	+455	+25.3	+436	+23.9	+412	+20.0	+346
Germany	−2.7	−34	−23.8	−292	−25.4	−312	−27.4	−337	−33.1	−406
Greece	–	–	–	–	–	–	–	–	+1.1	+102
Ireland	–	–	–	–	–	–	+0.9	+257	+0.7	+203
Italy	–	–	–	–	+10.4	+182	+9.2	+160	+5.8	+101
Luxembourg	–	–	+0.3	+669	+0.3	+646	+0.2	+615	+0.2	+530
Netherlands	+2.5	+165	−1.2	−76	−1.4	−94	−1.8	−117	−2.8	−182
Portugal	–	–	–	–	+3.5	+355	+3.4	+339	+2.9	+295
Spain	–	–	–	–	−10.7	−272	−11.4	−291	−13.4	−342
Sweden	–	–	–	–	–	–	–	–	+2.3	+258
UK	–	–	–	–	–	–	–	–	+15.2	+260

Votes refer to the European Council which, meeting in its composition of Heads of State or of Government, will decide which member states fulfill the necessary conditions for the adoption of a single currency; cf. Article 109j (3), Treaty on the European Union. The gains were calculated as described in Table 2, and the data used are as stated in Fig. 1 and Table 1. The table refers to the low regulation scenario of Table 3.

already reported in Table 3. The result is repeated in the last column of Table 5. The UK will be able to collect the sum of 15.2 billion ecus from the other members, which is 260 ecus for each British citizen, and each Swede would collect about the same amount (258 ecus). The Greek gains are 1.1 billion ecus in total or 102 ecus per capita. Again, all incumbent countries will experience losses as a result of the extension. The total cost of the extension would be 18.6 billion ecus which is more than five times the cost of the Mediterranean extension. Germany would have to bear the lion's share of this cost. Its seigniorage loss would increase by 5.7 billion ecus to a record level of 33.1 billion ecus.

It is tempting to make some guesses on the basis of these considerations as to which countries are likely to form the currency union. From Germany's isolated perspective, it might be best to realize a mini-union with the Netherlands, Austria and perhaps some other smaller countries. However, this would be very likely to destroy the European Community since France would never be willing to accept this. Thus the reasonable assumption for a minimal EMU would be the Franco–Germanic bloc. This bloc will already be so large and dominant in economic terms that eventually all other countries will be willing to join, even though they may have to pay for this in terms of seigniorage wealth. With every further extension, the group of new entrants would be net winners and the incumbents would be net losers. An extension to the Mediterranean group seems likely since Italian and Portuguese gains would nearly be outweighed by Spanish losses. But each country which joins the union in the next two expansion steps would cause losses to the incumbents. The costs of Denmark, Finland, and Ireland are small, but the UK, Sweden and Greece are so expensive for the others that one may wonder whether the other countries would wholeheartedly welcome them. These three countries have 7 votes less than they need for a blocking coalition, and they would cause seigniorage losses to all other member countries, which would average 87 ecus per capita.

8. Concluding remarks

It has often been argued that the European Monetary Union will mean socialization of the European currencies and that the outcome will be a new currency with an average quality and an average reputation. Typically, the quality of monetary policy, the inflation-proofness, or the use as an international transactions currency are thought of in this context. In this paper we have analyzed a much more straightforward aspect of this socialization process which has found little public attention: The redistribution of seigniorage wealth which results from the particular way in which the currency conversion is conducted.

Our analysis shows that, if the treaty of Maastricht is respected, the EMU will bring about huge wealth transfers between the European countries. In the likely case of a harmonized banking regulation (2%), an all-inclusive union will cost

Germany 33 billion ecus or 64 billion deutschmarks, whereas France will gain 20 billion ecus or 130 billion francs and the UK will gain 15 billion ecus or 11 billion pounds. Italy will gain 6 billion ecus or 11 trillion lires and Spain will lose 13 billion ecus or 2 trillion pesetas. In terms of per capita losses, Germany, Austria and Spain will be the main losers with losses of 406 ecus, 342 ecus and again 342 ecus, respectively. An inhabitant of Luxembourg, on the other hand, will enjoy a windfall gain of 530 ecus and an average Finn will gain 550 ecus.

Defenders of the Maastricht treaty hold the view that the redistribution of seigniorage is not a problem, because it will merely affect the future flow of central bank profits. This, it is maintained, is not the same as a redistribution of current wealth and has to be accepted as a natural consequence of EMU. This line of argument is not acceptable, because current wealth ownership is always the same as an entitlement to the future returns that this wealth generates. If future central bank profits can be attributed to the value of assets earmarked upon the act of currency conversion, a redistribution of seigniorage claims is the same as a redistribution of current wealth, and this is what we have considered in this paper.

We have not tried to predict those future central bank profits which will result from an expansion of the monetary base due to economic growth or due to an increasing use of the euro as an international transactions currency, because there are few objections to the way these profits are to be distributed among the EMU countries. Many Europeans may find distributing these profits according to population and GDP figures legitimate, because they are not the result of national effort but are rather the outcome of a joint European endeavour to make the euro an attractive and stable currency.

It would not have been difficult to design the ownership structure in the ECB in a way that avoids the redistribution of existing seigniorage wealth and distributes the gains from future increases in this wealth according to the rules of the Maastricht treaty. An obvious possibility would have been to allocate the *initial* equity contributions in proportion to the magnitudes of the respective monetary bases and the *additional* contributions necessitated by a future growth in the joint monetary base in proportion to population and GDP figures. It remains to be seen whether the re-negotiations of the Maastricht treaty which will take place in 1998 leave enough room for such a correction to be made.

References

European Monetary Institute, 1995, Annual report 1994. European Monetary Institute, Frankfurt.

Gros, D., 1993. Seigniorage and EMU. The fiscal implications of price stability and financial market integration. European Journal of Political Economy 9, 581–601.

Gurley, J.G., Shaw, E.S., 1960. Money in a Theory of Finance. Brookings Institution, Washington, DC.

Maennig, W., Hunger, A., 1996. Seigniorageverluste — Hemmnis für die Europäische Währungsunion?. Wissenschaftliches Studium 25, 227–232.

Patinkin, D., 1961. Financial intermediaries and the logical structure of monetary theory. American Economic Review LI, 95–116.

Schneider, F., 1994. Measuring the size and development of the shadow economy. Can the causes be found and the obstacles be overcome? In: Brandstätter H., Güth, W. (Eds.), Essays on Economic Psychology. Springer-Verlag, Berlin.

Seitz, F., 1995. Der DM-Umlauf im Ausland, Volkswirtschaftliche Forschungsgruppe der Deutschen Bundesbank, Diskussionspapier 1/95. Deutsche Bundesbank, Frankfurt.

Sibert, A., 1994. The allocation of seigniorage in a common currency area. Journal of International Economics 37, 111–122.

Sinn, H.-W., 1997. International implications of German unification. In: Razin, A., Sadka, E. (Eds.), Globalization: Public Economics Policy Perspectives, Proceedings of the 1996 IIPF Conference in Tel Aviv. Cambridge University Press, Cambridge, to be published.

Tori, C.R., 1997. Monetary union and the effect of seigniorage sharing. Journal of Macroeconomics 19, 193–204.

Anon, 1997. The winners and losers from EMU. Central Banking 7 (2), 6–10.