CESifo *Working Paper Series*

SEIGNORAGE WEALTH IN THE EUROSYSTEM: EUROWINNERS AND EUROLOSERS REVISITED

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Working Paper No. 353

November 2000

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Abstract

The rules laid down in Article 32 of the Protocol No. 18 on the Statute of the European System of Central Banks and of the European Central Bank of the Maastricht Treaty will significantly redistribute European seignorage income and hence the implicit entitlement to the € 352 billion stock of interest bearing assets which the central banks contributed to the currency union as of 1 January 1999. According to current plans, the redistribution will start by 1 January 2002. In terms of wealth equivalents and anticipating the Greek participation, Germany will lose € 30 billion (or 59 billion deutschmarks) and France will gain € 31 billion (or 202 billion French francs). Portugal will gain € 3.9 billion (or 792 billion escudos) and Spain will lose € 11 billion (or 1 879 billion pesetas). In per capita terms, Luxembourg, Finland and France will be the main winners with gains of € 1 309, € 627 and € 527, respectively, whereas a German will lose € 366 and a Spaniard € 287. The paper argues that this redistribution was not intended by the signing parties and recommends a revision of the Maastricht Treaty to correct the mistake.

Keywords: Central banks, European integration, European Monetary Union, seignorage

JEL Classification: E58, F33, F42

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Introduction

The European Monetary Union (EMU) socialises not only the good will and esteem that the national currencies have acquired but also the seignorage profit which the central banks earn by lending their money to the private sector at the market rate of interest. Throughout their histories central banks have accumulated interest-bearing assets step by step with the expansion of their respective monetary base which has followed the development of the economy. These assets, which total about € 350 billion in the euro-11 countries, are stocks of "historic" seignorage wealth, which will generate an eternal, annual stream of returns that will help finance government budgets. By 1 January 2002, the seignorage wealth of participating countries will be brought into, and socialised by, the currency union.

The socialisation of historic seignorage wealth will not occur in a legal sense, since only the future interest income generated by this wealth will be pooled and redistributed. The national central banks remain the legal owners of the assets backing the monetary base. However, from an economic point of view, the eternal socialisation of an asset's return is the same as the socialisation of the asset itself. Thus, in economic terms, there will indeed be a once and for all socialisation of current central bank assets in about a year from now.

The socialisation involves an effective net redistribution among the participating countries because the interest income received by a country may differ from what this country contributes. A country's share in the interest contribution to the pool depends on its share in the joint monetary base. However, the share in the interest received from the pool is given by the average of this country's population and GDP shares. A country whose monetary base at the start of the currency union was large relative to its size as measured by these two indicators will lose, and a country whose monetary base was relatively small will gain. A losing country could be one whose currency is widely used outside its own borders or one whose black market activities imply an unusually large usage of cash payments. This was noted in Remsperger (1996) and studied extensively in Sinn and Feist (1997) and Gros (1998). Not knowing precisely which countries would eventually participate in the currency union and what

the stock of seignorage wealth would be at the start of this union, Sinn and Feist estimated gains and losses of up to € 34 billion per country.

The redistribution of historic seignorage wealth is implied, though not openly spelled out, by Article 32 of the Protocol No. 18 (ex No. 3) on the Statute of the European System of Central Banks and of the European Central Bank (ECB) of the Maastricht Treaty. It seems fair to say that it was not understood and foreseen by the parties signing the treaty. It was only after the above-mentioned publications that politicians realised what they had signed, and the reaction was to postpone the beginning of the redistribution process by three years to clarify the matter. In 1998 the Governing Council of the ECB decided not to start the five-year transition period envisaged in Article 51 with the establishment of the currency union as of 1 January 1999. According to Article 32.3, transitional provisions were agreed on which are discussed in more detail below, but which in effect postpone the start of the redistribution process to 1 January 2002. There is no agreement yet on exact and final provisions concerning the redistribution process. The discussions about these rules are receiving new momentum right now, in the autumn of 2000, and thus it seems useful to reconsider the matter.

The Scope of the Study

The Bundesbank (2000, p. 13) was recently asked how much the introduction of the euro will cost the taxpayer. This is a simple, but far reaching question which we do not dare to answer, because we would then have to forecast the future monetary development of the countries with and without the currency union. Here we try to answer a more limited question which becomes clear if three categories of seignorage wealth are considered.[1]

(1) Historic seignorage wealth built up before 1 January 1999.

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[1] The calculations presented in this paper refer to wealth equivalents of long-term seignorage gains or losses, but not with the actual flows of transfers among the national central banks once EMU has begun. Predicting these flows would be meaningless since national moneys cease to exist. Given that with the euro, all central banks are able to produce the same quality of money, part of the German currency might well be issued in Portugal and vice versa. This will affect the net flows of payments between the central banks but not the gains and losses calculated here, which are all measured relative to the situation without EMU.

(2) The present value of increments in seignorage wealth that would have been built up by the single countries after 1 January 1999, had there not been a currency union.

(3) The present value of additional increments in seignorage wealth, if any, that will be generated after 1 January 1999, when the euro is more widely used outside Europe than the sum of the national currencies would have been without the currency union.

To answer the Bundesbank's question a country's distributional gains and losses over all three of these categories would have to be netted out. However, this is close to impossible since the required data are not available: partly because the analysis involved would be counterfactual, partly because the lack of knowledge about the euro's future. In this article we will therefore confine our attention to category (1) only and try to find out how the distribution of historic seignorage wealth will be affected by the currency union.

There are two reasons for this limitation of scope. Firstly, we want to produce cautious and unambiguous estimates of the redistributive wealth effects in order not to dramatise the issue. The figures under (2) could be much larger in present value terms than those calculated under (1), but under the assumption of identical growth rates of the national monetary bases they would just blow them up proportionately.[2]

Secondly, even if a country's gains under category (3) overcompensate any losses under (1) and/or (2), it is not clear that they legitimate such losses. It could well be argued that the extra increment in seignorage wealth, if any, which is due to the success of the euro should be distributed equally among the participating Europeans. That some Europeans gain more from the euro than others because they also gain from the socialisation of interest bearing assets the others possessed before the euro was introduced will be hard to understand for many tax payers.

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[2] Let i denote the common interest rate and r the common growth rate of the monetary base. Then the net gain or net loss of a country from category (2) is, in present value terms, $r / (i–r)$ times the respective figure calculated for category (1), whatever that may be. If, say, r=4% and i=6%, then the factor is 2; i.e. the net gain or loss from categories (1) and (2) taken together is three times the figure we report in this article. This was pointed out by Wenger (1997) in a response to Sinn (1997).

Apart from that it is by no means clear that there will be gains of type (3). Currently, the euro suffers from a flight of money holders outside the EU-11 countries from the deutschmark into the dollar, which amounts to a huge destruction of European seignorage wealth. The flight can probably be attributed to the three year delay between the announcement of the abolishment of the deutschmark and introduction of the new currency. Whether it will be reversed when the new bank notes arrive remains to be seen.

The novelty of this article relative to the previous literature is threefold. Firstly, it will offer redistributive figures that are calculated on the basis of the official final balance sheets of the countries introducing the euro rather than on estimates about these balance sheets. Secondly, it can use the knowledge of who actually participates in the euro, a question which was not clear when the original calculations were made. Thirdly, it will calculate the incremental redistributive effects of the countries that may join the EMU in the future.

Seignorage Wealth and Country Size

It is not easy to understand why central bank money is seignorage wealth, because accounting practices blur the picture. The currency issued by a central bank is listed on the liability side of its balance sheet, and the assets obtained in exchange for the currency are listed on the asset side. From an accounting perspective, money creation does not generate wealth with a central bank, because both sides of the bank's balance sheet grow simultaneously without generating any differential equity capital. Indeed, this accounting custom may be the reason why the signing parties did not really understand that they were redistributing existing wealth when they founded the currency union.

However, the point is that, in general, the central bank does not pay interest on the currency it issued while it collects interest on the assets obtained in exchange – the seignorage profit. The seignorage profit results from the return on the assets backing the outstanding stock of currency, and these assets are the seignorage wealth. From an economic perspective,

seignorage wealth is a net wealth of the central banks because the stock of outstanding currency will never have to be serviced with interest payments or redemptions.[3]

As mentioned above, the eternal socialisation of an asset's return is the same as the socialisation of the asset itself. This fact enables us to base our calculations on the socialisation of seignorage wealth rather than interest income. From a theoretical perspective there is little difference in focusing on interest income or seignorage wealth because the latter is the present value of the former. However, from a practical perspective the difference is large, since an interest-based calculation would involve an estimate of the time path of the average interest rate applicable to the assets backing the outstanding stock of currency.[4] The wealth approach avoids this difficulty. A country's seignorage wealth equals this country's stock of currency to the very last cent and it is precisely equal to the present value of the interest income the backing assets generate, even though the time path of the average rate of interest for these assets may not be known.[5]

Under certain conditions, the stock of a country's seignorage wealth is equal to its monetary base, i.e. the sum of coins, bank notes and private accounts with the central banking system. However, in the present context some qualifications are necessary. Before the currency union it was a matter of debate whether the reserves that private banks are required to hold with the central bank should be counted as part of the central banks' seignorage wealth. Some countries imposed large reserve requirements, others imposed low or no requirements, some countries paid interest on the reserves held with the central bank, others did not.[6] This ambiguity has disappeared in the European currency system because the

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[3] In monetary theory, seignorage wealth is even considered as net wealth for the whole economy, because the currency generates private liquidity services that outweigh the interest foregone by holding it.

[4] In addition, the liquidity services of low-interest assets would have to be considered.

[5] The present value of an income stream is defined as today's market value of an asset that is able to generate this stream. Thus the equivalence between our stock approach and a correctly specified flow approach holds strictly, regardless of what the time paths of returns on the assets earmarked to back the currency will be, provided the assets backing the currency are evaluated at their true market prices.

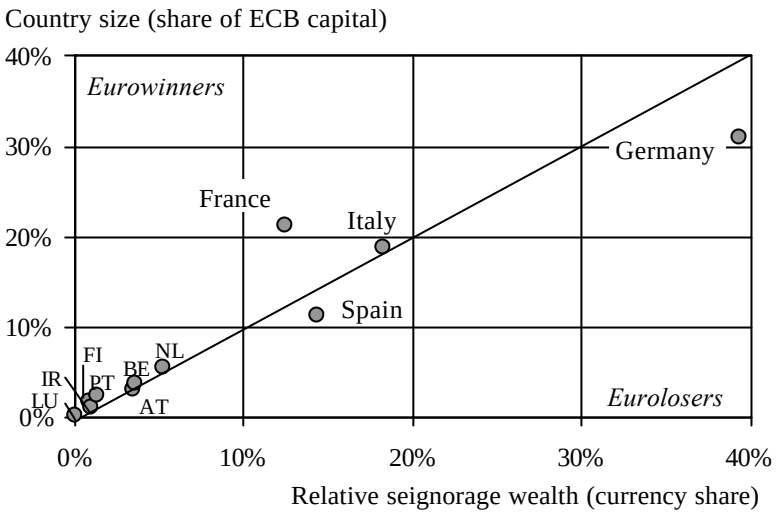
[6] While France only imposed an interest-free minimum reserve requirement of between 0.5% and 1% on its banks, and countries like Greece, Italy, Ireland and the Netherlands paid interest on the minimum reserves

required minimum reserves with the central bank have been harmonised and the central banks now uniformly pay interest on them. The reserve requirement is 2% of a base which consists of time deposits with a maturity of no more than two years, of debt securities and of money market papers. Banks are granted an interest rate which equals the average of the ECB's rates on the Eurosystem's main refinancing operations; this rate is currently 4.75%. The minimum reserves therefore cannot be counted as net seignorage wealth and they are subtracted in our calculations. Voluntary, non interest-bearing reserves in excess of the minimum reserves, on the other hand, should be included: however, they are so small that we neglect them. We also neglect the role of coins which, unlike the banknotes, are not included in the redistribution mechanism and for which we have no database. Coins are a very small fraction of a country's monetary base.

The total amount of seignorage wealth which the 11 countries brought into the system as of 1 January 1999, was € 352 billion. Naturally, big countries contributed more than small countries. This is shown in Figure 1, which relates a country's size to the seignorage wealth contributed.

held by the private banking system, Germany had a rather restrictive system. From 1950 to 1994 the Bundesbank required that well over 10% of a bank's demand deposits be backed by central bank money without paying interest for it. Sinn and Feist (1997) therefore studied the implication of alternative harmonisation scenarios for the distribution of seignorage wealth.

Figure 1: *Country Size vs. Relative Seignorage Wealth*



Note: Share of ECB capital as of 1 January 1999; currency share as of 31 December 1998; AT–Austria, BE–Belgium, FI–Finland, IR–Ireland, LU–Luxembourg, NL–Netherlands, PT–Portugal. **Sources:** European Central Bank (1998): Key for the ECB's Capital, Press Release, 1 December, Frankfurt; Inter–national Monetary Fund (2000): International Financial Statistics, March, Washington, D.C.

We measure a country's "size" by the average of its shares in the aggregate GDP and in the aggregate population because, by the rules of the Maastricht Treaty, this average determines the share of the capital endowment contributed by that country. The ordinate of the diagram thus also measures this endowment. The total capital endowment is just € 5 billion which is tiny relative to the € 352 billion stock of interest-bearing assets contributed in the form of seignorage wealth. It has little more than a symbolic function and serves primarily to establish a stake in the seignorage profit.[7] It does not involve any resource cost for the contributing countries, because the interest it generates for the ECB will be distributed in proportion to the capital endowment. The real contribution to the currency union is not the contribution to the equity capital, but the contribution to the aggregate seignorage wealth – the interest bearing assets which the national central banks had accumulated during their respective histories of money creation and whose return will be socialised. The share in the equity capital does not indicate a contribution, but a drawing right – the right to participate in the profit

[7] Not even the countries' voting power in the ECB Governing Council depends on it. While Germany, for example, brings in 39% of seignorage wealth and has a capital share of 31%, its share of votes is 9%.

distributions of the ECB. It determines the single country's share in the total seignorage wealth contributed by all countries.

Figure 1 shows that the correlation between the countries' shares in, and contributions to, seignorage wealth is close, but not perfect. Some countries, notably Spain and Germany, are located below the 45º line, others like France are located above that line. Germany contributes 39% and receives 31% of seignorage wealth, Italy contributes 18% and receives 19%, Spain contributes 14% and receives 11%, France contributes 12% and receives 21%. Obviously, as indicated in the introduction, there is considerable redistribution of seignorage wealth among the participating countries.

There are a number of reasons for the imbalance between country size and seignorage wealth. First of all, 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 which is worth about € 30-40 billion.[8] The fall of the Iron Curtain, the traditional strength of the German export industries and the conservative monetary policy of the Bundesbank have all contributed to the dominant role of the deutschmark. The high figures for the Spanish seignorage wealth can partly be explained by the importance of the Spanish overseas connections, and partly by the large share of the Spanish shadow economy, where cash rather than bank transfers are used as a means of payment. According to Schneider and Ernste (2000, p.199), the Spanish share in GDP of black market activities is about 23%, while the figure for Germany is only 14%. The low share of seignorage wealth contributed by France may be attributed to the fact that the French Franc is not used much outside that country, and possibly also to a well-developed banking sector and advanced payment habits.

[8] Cf. Rogoff (1998) and Seitz (1995).

Redistribution of Seignorage Wealth through EMU

The Maastricht Treaty mandates the ECB monetary income to be shared among member national central banks according to their respective capital key. If the capital keys happened to match the pre-euro distribution of seignorage wealth across the European countries, there would be no effective redistribution of seignorage wealth. In Figure 1, all countries would be located strictly along the 45° line. However, this is not the case. For the reasons explained, a unit of capital carries very different amounts of seignorage wealth depending on where it comes from.

The exact implications for the redistribution of seignorage wealth are summarised in Table 1, which refers to the situation of 1January 1999. Columns one and two show the absolute and relative amounts of seignorage wealth contributed to the pool – the currency circulation – and columns three and four show the absolute and relative amounts of seignorage wealth received from the pool, where the latter is, as explained, given by the shares of capital contributed which themselves reflect the population and GDP shares. The most interesting information is contained in columns five and six. They show the absolute gains and losses of the different countries and the respective per capita amounts.

Table 1: *Winners and Losers from the Redistribution of Seignorage Wealth*

	Seignorage wealth contributed		Seignorage wealth received		Gain or loss	
	€ billion	share	€ billion	share	total, € bn	per capita, €
	[1]	[2]	[3]	[4]	[5]	[6]
Austria	12,3	3,5%	10,5	3,0%	-1,8	-222
Belgium	12,5	3,6%	12,8	3,6%	+0,2	+24
Finland	3,0	0,8%	6,2	1,8%	+3,3	+634
France	43,8	12,4%	75,1	21,3%	+31,3	+535
Germany	138,6	39,4%	109,2	31,0%	-29,3	-358
Ireland	3,4	1,0%	3,8	1,1%	+0,4	+97
Italy	64,5	18,3%	66,4	18,9%	+1,9	+34
Luxembourg	0,1	0,0%	0,7	0,2%	+0,6	+1 319
Netherlands	18,6	5,3%	19,1	5,4%	+0,5	+33
Portugal	4,6	1,3%	8,6	2,4%	+4,0	+401
Spain	50,7	14,4%	39,7	11,3%	-11,0	-281
Total	352,0	100,0%	352,0	100,0%	0,0	–

Note: Share of ECB capital as of 1 January 1999; currency share and population data as of 31 December 1998. **Sources:** European Central Bank (1998): Key for the ECB's Capital, Press Release, 1 December, Frankfurt; International Monetary Fund (2000): International Financial Statistics, March, Washington, D.C., Statistisches Bundesamt (2000): Statistisches Jahrbuch für das Ausland, Metzler-Poeschel: Stuttgart, p. 40.

Obviously, France is the big winner and Germany the big loser of the redistribution of seignorage wealth. While France brings in € 43.8 billion and receives € 75.1 billion, Germany contributes € 139 billion and receives € 109 billion. The French gain is € 31.3 billion, and the German loss is € 29.3 billion. Without being aware of it, Germany made a net payment of about € 30 billion to France to be able to participate in the currency union.

In per capita terms the redistribution between the two countries is also substantial. The average French citizen will gain € 535, which corresponds to a sum of 3 510 francs, and the average German citizen will lose € 358 or 699 deutschmarks.

Next to Germany, Spain is the largest loser. In total, the Spanish losses amount to € 11.3 billion which is € 281 or 46 761 pesetas per capita. Austria is the only further loser with € 1.7 billion in total and € 222 or 3 047 shillings per capita.

The majority of countries are winners: Portugal, Finland, Italy, Luxembourg, the Netherlands, Ireland, and Belgium, in the order of their absolute gains. A citizen of Luxembourg gains most, with € 1 319 or 53 211 Belgian francs, followed by a Finn with € 634 or 3 771 finmarks.[9]

To interpret these figures correctly, we repeat that they refer to the wealth equivalents of the redistribution of that part of the seignorage profit which can be attributed to the assets that the central banks had accumulated before 1 January 1999. There are two things which the reader should keep in mind in order not to misinterpret our results. Firstly, the figures measure the once-and-for all redistribution effect and do not refer to annual gains and losses. In principle, the annual gains and losses can be calculated by multiplying the figures given in column five of the table with a market rate of interest, but since it is not clear what the future rate will be, such a calculation would involve a good deal of guesswork. For the reasons explained, only a wealth-based calculation is free from such arbitrariness. Secondly, the redistribution figures include neither the present value of future increments in seignorage wealth that would have occurred in the course of an continued growth process had the euro not been introduced, nor the present value of any additional future increments in seignorage wealth that might result from a particular attractiveness of the euro as an international transactions and reserve currency (compare the introduction, definitions 2 and 3). We do not want to argue that these increments should not be distributed according to country size, but we want to raise the question of whether the countries participating in the euro really wanted to enact such a gigantic redistribution of claims on existing assets as they have done.

Additional Participants to the Eurosystem

What will happen if additional countries join the Eurosystem? In June 2000 Greece was accepted by the EU Council as a participant of the euro area as of 1 January 2001. Will

[9] Although our results are based on the superior knowledge which time has produced by now, they are closely in line with our earlier projections as published in Sinn and Feist (1997).

Greece gain or lose from participating in the redistribution of historic seignorage wealth, and what will the Greek participation cost the other countries? And what about Denmark, the UK and Sweden, should they ever wish to join? Have the Danes missed the chance of becoming richer when they decided not to join the EMU, or have they prevented a wealth loss by not joining?

The answers to these questions are given in Table 2, which distinguishes alternative entrance scenarios. Columns one and two show how much a country would gain if it were the only one to join the now-existing EMU. Columns three and four refer to a certain entrance sequence and show how much a country would gain if it were the last to join after the countries listed above had already joined. For example, Sweden would gain € 2.9 billion if it entered in addition to Greece, Denmark and the UK and if no further country joined. Columns five and six, finally, show how much each single country would gain if all four candidates enter.

Table 2: *Gains from Participation in the Eurosystem*

	Single effect		Cumulative effect		All-inclusive effect	
	total, € billion	per capita, €	total, € billion	per capita, €	total, € billion	per capita, €
	[1]	[2]	[3]	[4]	[5]	[6]
Greece	2,2	209	2,2	209	1,4	137
Denmark	2,8	524	2,7	515	2,2	409
UK	25,8	438	25,2	428	24,8	421
Sweden	3,8	434	2,9	330	2,9	330
Eurosystem	–	–	–	–	-31,3	-108

Note: Share of ECB capital as of 1January 1999; monetary, exchange rate and population data as of 31 December 1998. **Sources:** European Central Bank (1998): Key for the ECB's Capital, Press Release, 1 December, Frankfurt; International Monetary Fund (2000): International Financial Statistics, March, Washington, D.C., Statistisches Bundesamt (2000): Statistisches Jahrbuch für das Ausland, Metzler-Poeschel: Stuttgart, p. 40.

The table makes it clear that all candidates for membership would indeed gain from a participation in the redistribution of historic seignorage wealth. If all countries join, the largest

winner both in absolute and per capita terms will be the UK. It will be able to increase its claim on seignorage wealth by € 25 billion, which is more than € 400 per capita.

If Greece remains the only country to join the EMU, it will gain € 2.2 billion in total, or € 209 per capita. The decision to let Greece participate thus will not only provide this country with a stable currency but also with a considerable wealth endowment.

Had Denmark decided to join in addition to Greece while the UK and Sweden stayed absent, it would have gained another € 2.7 billion in total, or € 515 per capita. The per capita sum is one of the largest among the winning countries. One wonders whether the Danes have made a wise decision.

Of course, the gains depicted in Table 2 are matched by equivalent losses of the now-existing 11 members in EMU. As we study the redistribution of a given stock of seignorage wealth, the sum of all gains and losses resulting from a new membership is zero. Table 3 clarifies how much individual countries which are now members of the Eurosystem lose if additional countries join.

Table 3: *Losses Due to the New Participants*

	Greece		Denmark		United Kingdom		Sweden	
	total, € million [1]	per capita, € [2]	total, € million [3]	per capita, € [4]	total, € million [5]	per capita, € [6]	total, € million [7]	per capita, € [8]
Austria	-66	-8,1	-79	-9,8	-720	-89,2	-71	-8,8
Belgium	-80	-7,8	-96	-9,5	-874	-85,9	-86	-8,4
Finland	-39	-7,6	-47	-9,1	-426	-83,0	-42	-8,2
France	-467	-8,0	-565	-9,7	-5 134	-87,8	-505	-8,6
Germany	-680	-8,3	-822	-10,0	-7 470	-91,1	-734	-9,0
Ireland	-24	-6,5	-29	-7,8	-259	-71,0	-25	-7,0
Italy	-414	-7,2	-500	-8,7	-4 543	-79,1	-446	-7,8
Luxembourg	-4	-9,9	-5	-12,0	-46	-108,9	-4	-10,7
Netherlands	-119	-7,6	-144	-9,2	-1 305	-83,8	-128	-8,2
Portugal	-53	-5,4	-65	-6,5	-587	-59,0	-58	-5,8
Spain	-247	-6,3	-299	-7,6	-2 712	-69,0	-267	-6,8
Greece	+2 192	+209,0	-69	-6,6	-627	-59,8	-62	-5,9
Denmark			+2 719	+515,5	-510	-96,6	-50	-9,5
UK					+25 211	+428,0	-440	-7,5
Sweden							+2 917	+329,9

Note: Share of ECB capital as of 1January 1999; monetary, exchange rate and population data as of 31 December 1998. **Sources:** European Central Bank (1998): Key for the ECB's Capital, Press Release, 1 December, Frankfurt; International Monetary Fund (2000): International Financial Statistics, March, Washington, D.C., Statistisches Bundesamt (2000): Statistisches Jahrbuch für das Ausland, Metzler-Poeschel: Stuttgart, p. 40.

The first two columns show who pays how much for the Greek gain of € 2.192 billion. Obviously, Germany is again the largest payer with a net contribution of € 680 million which increases its total loss from the currency union to almost € 30 billion. However, the French and Italian gains also shrink substantially by € 467 million and € 414 million, respectively. This sounds large, but in fact the respective per capita numbers are small. A German, French or Italian citizen may well be prepared to pay the € 7–8 which the Greek membership costs.

From a purely financial perspective, all countries should be happy that Denmark has decided not to join, for if it had done so, they would all have lost resources. Again, however,

in per capita terms these are small numbers. Even a citizen of Luxembourg would not have lost more than € 12.

Most expensive would be the integration of the UK, which would cost Germany € 7.5, France € 5.1 and Italy € 4.5 billion, respectively, and which would impose a burden of between € 80 and € 90 on the citizens of most countries. Finally, if Sweden joined, the financial burden imposed on other countries would again be similar to that of Denmark.

How to Resolve the Problem

Given the magnitudes involved it is little wonder that calculations of this kind stirred up debates in 1997, especially in the losing countries.[10] As was mentioned in the introduction, the ECB reacted to this debate by postponing the redistributive arrangements laid down primarily in Article 32 of the Protocol on the Statute of the European System of Central Banks and of the ECB for a transition period of three years.[11] Redistribution of seignorage will only take place on a large scale from 1 January 2002 onwards, when the so-called "earmarking method," which is reflected in the calculations presented here, will become effective.

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[10] The political interest in the redistribution of seignorage wealth is well documented in a query in the German parliament (Deutscher Bundestag, 1997), in which the secretary of state at the ministry of finance reports that the Bundesbank will stress the point in further consultations with EU central banks and urge for a strengthening of the German position.

[11] Instead of the arrangements described in the Protocol, an auxiliary redistribution method was agreed on for the transition period. According to this method, the monetary income to be distributed among the central banks is determined indirectly (hence the term "indirect method") by simply multiplying a specified reference rate of interest with a defined liability base of the ECB. The reference rate of interest is equal to the interest rate of main refinancing operations, and the defined liability base consists of current accounts, deposit facilities, fixed term deposits, fine-tuning reserve operations and deposits related to margin calls. The assets backing the banknotes in circulation were deliberately excluded from the liability base in order to postpone the effective redistribution mechanism. For a similar reason, interest paid by national central banks on items within the liability base is deductible and only the net income is pooled. Since minimum reserve requirement deposits which constitute the bulk of the so-defined liability base are remunerated at the Eurosystem's main refinancing rate, the order of magnitude of the income eligible for redistribution turned out to be very small (about € 35 million). In fact, the income calculated this way was not even enough to cover the ECB's operating cost such that, in 1999, the ECB had to charge its member banks a fee of € 184.6 million in total (cf. European Central Bank, 2000).

There is, however, a second transition period which is foreseen in Article 51 of the Protocol. According to this article, the ECB Governing Council has the right to exempt certain fractions of national seignorage income from redistribution for a period of five years. In the first year, at least 40% of the seignorage has to be redistributed according to the capital keys, and with each consecutive year this percentage has to increase by at least 12 percentage points so that the full socialisation of historic seignorage wealth will be completed by the end of the fifth year at the latest. If the Council sticks to its current timetable and then makes use of this provision, this will be 1 January 2007.

What can be done about the situation? Roesl and Schaefer (2000) argue that the central banks of the disadvantaged countries could be given the right to reduce their interest contributions to the pool by earmarking low interest assets to their monetary bases. At first sight this seems to be a possible solution. However, the proposal neglects the fact that in EMU, a single country has little incentive to hold liquid, low interest-bearing assets. If it holds such assets, it does so for the benefit of the whole system in terms of providing the necessary flexibility for open market operations. Suppose, starting from a situation where all countries hold high-interest assets, the ECB asks a particular central bank to exchange their assets against liquid, low-interest assets in order to be able to gain more flexibility for market operations. This exchange reduces the interest income of the central bank and its interest contribution to the pool, while more liquidity services are available to the system. According to their size, all countries participate in the interest loss and in the liquidity services. A national gain, which could mitigate the disadvantages of the loser countries, will not result from this asset exchange.

Another suggestion was made by Sinn and Feist (1997) and supported by Gros (1998). Its essence was to allocate the *initial* equity contributions in proportion to the magnitudes of the respective monetary bases as of 1 January 1999 and the *additional* contributions necessitated by a future growth in the joint monetary base in proportion to country size. This suggestion implies that historic seignorage wealth is exempt from redistribution, but that the increments in seignorage wealth due to the normal growth of the

European economies and due to any extraordinary success of the euro are shared equally according to country size (see definitions 2 and 3 of the introduction).

Such a rule would probably require an amendment to the Maastricht Treaty. Given that the redistribution clauses in the treaty were not understood by the signing parties, this amendment should be agreeable to the member countries.

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