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THE FEDERAL DESIGN OF A CENTRAL BANK IN A MONETARY UNION: THE CASE OF THE EUROPEAN SYSTEM OF CENTRAL BANKS

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Abstract
In this paper we analyze the European System of Central Banks (ESCB) as a federal central bank system. First, the degree of decentralization of the ESCB will be briefly compared with its predecessor, the Deutsche Bundesbank, and its counterweight in the US, the Federal Reserve System. Moreover, the development during the period 1990-99 of the total, economics and research staffing of the ECB and the national central banks in the EU will be investigated and also the staff ratios of the national central banks in 1999. Furthermore, the research activities of the central banks in the European Union over the period 1990-99 will be analyzed both in terms of input (economics and research staff) and output (quality-weighted number of articles in scientific journals). The share of economics research staff in total staff of the national central banks varies between 0.02 and 0.17. The ECB has the highest ratio between economists and researchers and other staff. A ranking of research performance based on the quality-weighted number of scientific articles per economics and research employee reveals that the Bank of Finland has the best research performance of European central banks, followed by De Nederlandsche Bank, the Banco de Portugal and the Oesterreichische Nationalbank. There is only a weak relationship between the research performance and the share of research staff. The conclusion "small is beautiful" also seems to hold for the economics and research departments of the European central banks.

This paper was presented at the conference on "Monetary Union: Theory, EMU Experience, and Prospects for Latin America" held at the University of Vienna and jointly organized by the Central Bank of Chile and the Oesterreichische Nationalbank on April 14-16, 2002. Hard copies of this paper must be ordered by e-mail from Oesterreichische Nationalbank (as working paper 64). Further information, see www.oenb.co.at/workpaper/pubwork.htm.

The author thanks his discussants José Luis Malo de Molina and Franz Seitz for their valuable comments. He is also grateful to Eduard Hochreiter, Jürgen von Hagen and other participants of the conference "Monetary Union: Theory, EMU Experience, and Prospects for Latin America" in Vienna for their remarks.
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1. The European System of Central Banks: A Federal Central Bank System

The European System of Central Banks (ESCB) consists of the European Central Bank (ECB) in Frankfurt-am-Main and the national central banks of the fifteen member states of the European Union (EU). The basic tasks of the ESCB is to determine and implement the monetary policy in the euro-zone, to perform money market operations and currency market transactions (including foreign exchange intervention), to hold and manage official currency reserves of the in the euro-zone participating countries and to promote an efficient and prompt working of the (European) flow of payments. These are all areas, in which the euro-zone national central banks have had to hand over their monopoly to the ESCB from January 1, 1999 onwards. Such a transfer of the national policy sovereignty has been unique till now in the history of European integration. The ECB and the participating national central banks are denoted as the *Eurosystem*. The Eurosystem is governed by two decision making official bodies, the *Governing Council* and the *Executive Board*.[1] The Governing Council is the most important decision making official body of the federal central bank system and consists of the management of the ECB, the Executive Board, and the Governors and Presidents of the national central banks of the countries within the euro-zone. The Governing Council is responsible for the determination of the euro-wide monetary policy, whereas the Executive Board is qualified to implement this monetary policy in accordance with the by the Governing Council determined decisions and guidelines. Furthermore, the Executive Board gives instructions to the national central banks in carrying out the execution of the euro-wide monetary policy, in particular money market management. The Executive Board of the ECB consists of the President, the Vice-President and four other members. The European Council appoints the members of the Executive Board for a term of (at most) eight years and the sitting members cannot be reappointed. The impossibility of reappointment is intended to guarantee their personal independence. With regard to the monetary policy decision making both the members of the Executive Board and the remaining members of the Governing Council are supposed not to act as representatives of the national interest, but in a completely independent capacity. The Executive Board comes together at least ten times a year and meets in practice every two weeks. This happens most of the time in Frankfurt-am-Main, but not always. By the tradition of the Bundesbank the Governing Council wants on occasion to meet at a national central bank to underline the European nature of the system.

Recently, the Governing Council of the ECSB decided to reduce the frequency of monetary policy decisions in principle from every two weeks to every month. President Duisenberg stated in that respect the following (see ECB, 2001, p. 3): “Finally, I would like to inform you that the Governing Council has decided that, as from today, it will – as a rule – assess the stance of the ECB’s monetary policy only at its first meeting of the month. Accordingly, interest rate decisions will normally be taken during that meeting. At the second meeting of the month, the Governing Council will deal for the most part with issues related to other tasks and responsibilities of the ECB and the Eurosystem. After the second meeting of the month, a press release on the ECB’s monetary policy decisions will no longer be issued. Obviously, if warranted by the circumstances, the Governing Council can still decide to change the key ECB interest rates at any time, regardless of previously scheduled meetings (as was recently demonstrated by the decision

[1] In addition there is a General Council that exists of the Executive Board and the Governors and Presidents of all the fifteen EU countries. When all the EU member states participate in the euro, than the ESCB and the eurosystem respectively the General Council and the Governing Council will converge. See also: Eijffinger and De Haan, (2000).

to lower interest rates on 17 September 2001).” This reduction of the frequency of monetary policy decision making as a rule is good news because a lower frequency mitigates uncertainty regarding the European money market interest rate, and, thereby, its volatility.

2. The European System of Central Banks: The Degree of Decentralization

The ECSB follows the decentralization principle. This means that the ECB makes, as much as possible and suitable, an appeal to the national central banks as her operational arms for the implementation of monetary policy transactions. The national central banks should follow in a uniform way the instructions and guidelines of the ECB in such a way that this decentralized approach does not undermine the smooth functioning of the Eurosystem. Some critics, for example *The Economist*, think that the decentralization of the ESCB is an unfortunate design flaw of the designers of the central bank system.[2] According to them the structure of the ESCB is more decentralized than other federal organized central bank systems, like the German Bundesbank and the US Federal Reserve System. Within the ESCB national central banks have more power than the regional banks in other federal systems. In the first place the system has a decentralized *voting system*, in which at this moment twelve of the eighteen votes in the Governing Council are with the national central banks. This is a relative high number in comparison with presently the nine votes of the German regional *Landeszentralbanken* within the (at most) seventeen members consisting *Zentralbankrat*, the official body of the Bundesbank that determined monetary policy in Germany till January 1, 1999.[3] This number of national votes is also relatively high in comparison with the five Presidents (four Presidents on a rotating basis and the President of the Federal Reserve Bank of New York) of the regional Federal Reserve Banks with voting power within the twelve members counting *Federal Open Market Committee*, which is responsible for the open market policy in the United States. The *Board of Governors* has got a comfortable majority of seven votes in this important decision making body.[4] Although the Governing Council of the ESCB is considered to determine a ’one-size-fits-all’ policy in view of the whole euro-zone, there is always the danger that the national central bankers in the Governing Council will be influenced by the economic, financial and monetary circumstances in their own country. Such a national orientated voting behavior will certainly weaken the credibility and effectiveness of the Eurosystem's monetary policy. [5]

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[2] See: *The Economist*, Euro Towers or Fawlty Towers?, 31 October 1998.

[3] Very recently, the Deutsche Bundestag (parliament) has proposed a complete reorganization of the Zentralbankrat of the Bundesbank to totally eight members of which the President, Vice-President and two other members will be appointed by the Federal Government and four members on recommendation of the Bundesrat (senate) after consulting the Federal Government. See: Kissler and Preuschoff (2002).

[4] For a description of the development of the political and institutional independence of the Federal Reserve System, see: Akhtar and Howe (1991). These authors demonstrate that the Federal Reserve System had in the 1930s a more decentralized monetary policy decision making, which was responsible for its weakened position as monetary policy maker. The experience of the 1930s resulted in a more centralized decision making process within the Federal Reserve System.

[5] According to De Haan, Berger and Inklaar (2002), the decision-making process of the ESCB is too decentralized in case of diverging economies and preferences. For the euro area countries they find that, despite convergence, important differences in terms of economic performance and preferences remain. As all national central banks have one vote within the Governing Council, there is a risk that national considerations may prevail over euro-wide considerations.

Some other critics, mainly from the large euro countries, think that the smaller euro countries are more than proportionally represented in the Governing Council of the ESCB. The central bankers of the eight smaller countries - Austria, Belgium, Finland, Greece, Ireland, Luxembourg, the Netherlands, and Portugal - have with ten (eight national central bankers plus two members in the Executive Board) of the eighteen votes a majority in the Governing Council. This majority forms a sharp contrast with the two votes for Germany (one national central banker and one Executive Board member), whereas the German GDP is about twice the combined GDP of these eight smaller countries together.[6] Nevertheless, the designers of the ESCB have, also on instigation of the German government of that time, deliberately chosen for the principle of 'one (wo)man, one vote' to underline the collective responsibility of the Governing Council. The system of collective decision-making within the ESCB compensates for possible power broking by large countries like France and Germany.[7]

The voting power is obviously in the advantage of the national central banks, but the ESCB is also decentralized in other ways.[8] In this respect one might think of the relative size of both the total staff and the staff of the economics and research department of the ECB in Frankfurt-am-Main that both in total and concerning the economic department in comparison with the total, economics and research staff of the participating national central banks. Next to this the size of the total ECB staff (based on 1999 data) is also still much smaller than the size of the directorates of other federal central bank systems, namely the Board of Governors of the Federal Reserve System in Washington, D.C. and the Directorate (*Direktorium)* of the Deutsche Bundesbank in Frankfurt-am-Main. As is commonly known, the Bundesbank was perceived as the role model for the design of the ESCB. The relatively size of the total staff and the economics and research staff of the ESCB (ECB and the national central banks) and the staffing of the Federal Reserve System (Board of Governors and Federal Reserve Banks) and the Deutsche Bundesbank (Directorate and Landeszentralbanken) are reproduced in Table 1. From Table 1 it is quite evident that the trimming down of both the total staffing (almost 16000 employees) and the economics and research staffing (more than 200 employees) of the whole Bundesbank, in particular at the regional Landeszentralbanken, is just a matter of time. The same applies for the *Banque de France* with its totally 17000 employees (estimation) which mostly due to the large number of employees at its regional *Agences*.

[6] The GDP per vote in the Governing Council of the ECB differs from 14 billion euro for Luxembourg to 933 billion euro for Germany. The Netherlands with the ECB President and the President of De Nederlandsche Bank has a favourable position with a GDP of 160 billion euro per vote (based on OECD data from 1997).

[7] See Hochreiter (2000) about the *de jure* empowerment of small EU countries (e.g. Austria and the Netherlands), which have pegged to the Deutsche mark before January 1, 1999.

[8] For a detailed, yet not entirely objective argumentation: Angeloni (1999).

Table 1. The Degree of Decentralization of the Federal Central Bank Systems

Federal central bank systems: total system versus centre and ratio centre/total system	**Total number of employees of the federal central bank system and centre**	**Number of employees of economic and research departments of total system and centre**
Federal Reserve System	25000	830
-Board of Governors	1700	374
-Ratio Board / Total	6.8%	45%
Deutsche Bundesbank	15881	223
-Directorate	2579	72
-Ratio Directorate / Total	16%	32%
ESCB (ECB & NCBs)	47942	1628
-ECB	732	134
-Ratio ECB / ESCB	1.5%	8.2%

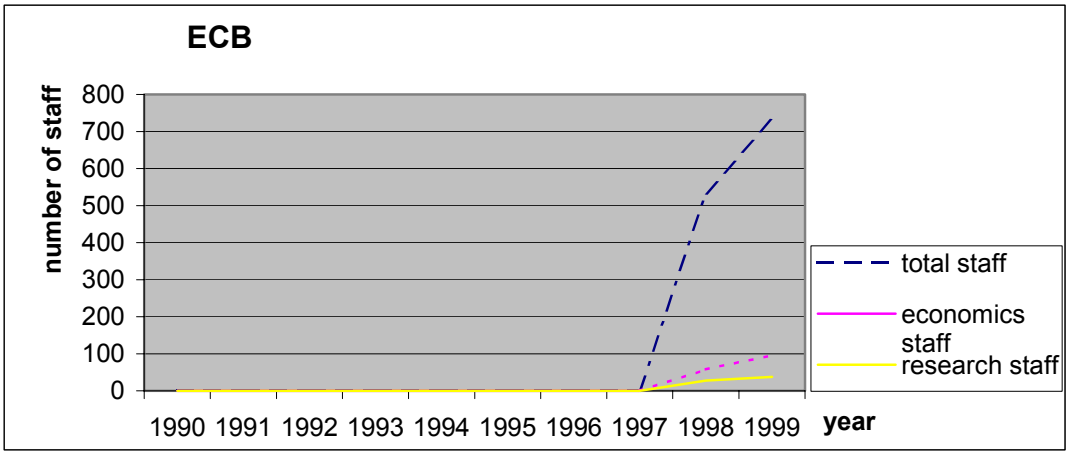
The Federal Reserve System employees are based on 1996 data (partly estimated), Deutsche Bundesbank employees are based on 1998 data and the ESCB employees are based on 1999 data.

3. The Total, Economics and Research Staff of the European Central Bank and the National Central Banks in the European Union

Despite of the very recent expansions of its staff, the ECB in Frankfurt-am-Main is both in terms of its total staff and its economics and research staff still quite modest when compared with a federal central bank system like the Federal Reserve. It is clear that the ECB recruits especially employees for its economics department. This has not only to do with the fact that the ECB delegates operational tasks to the participating national central banks, but also with the explicit task of the ECB to collect euro-wide statistical data and to conduct a euro-wide analysis of the economic, financial and monetary developments. In Figure 1 the development of the number of employees of the ECB is shown. The ECB was established in June 1998. In 1999 the total staff consisted of 732 people, of which 96 people belonged to the economics staff and 39 to the research staff.[9]

[9] However, it should be mentioned that the ECB is expanding pretty fast in terms of total staffing and economics and research staffing. The most recent data (based on the beginning of 2002) are 149 employees at the Directorate-General Economics and 50 employees at the Directorate-General Research (including secretaries, research analysts and economist statisticians).

Figure 1. Total, Economics and Research Staff of the European Central Bank



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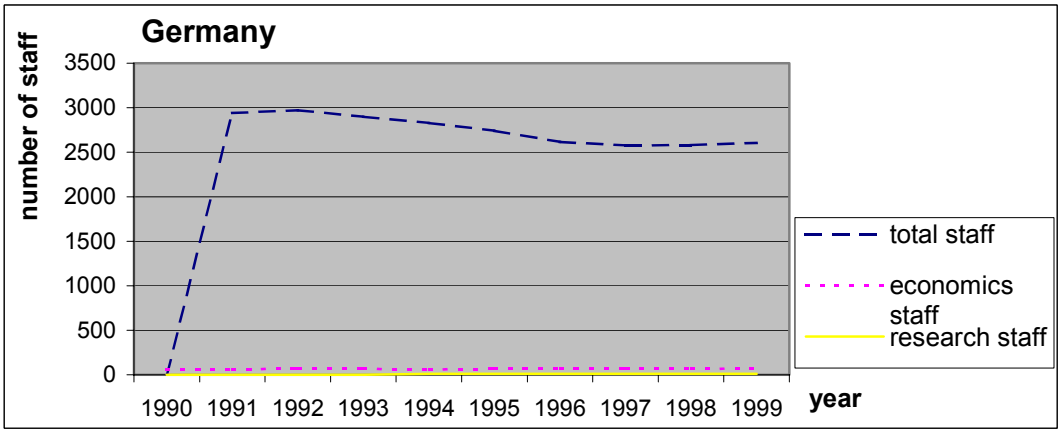
Finally, the huge number of employees working on the national central banks within the ESCB, in total almost 48000 employees (based on 1999 data), in striking. The US Federal Reserve System performs similar tasks with almost the half of the personnel, namely 25000 employees (based on 1996 data). It is evident that some trimming down of the national central banks, especially the *Deutsche Bundesbank* with his almost 16000 employees (based on 1998 data) and the *Banque de France* with his roughly 17000 employees (estimation) is unavoidable. In Figure 2 the number of staff is shown of the Directorate (*Direktorium)* of the German Bundesbank in Frankfurt-am-Main during the period 1991-1999 (data were not available for 1990). In total there were 2606 employees working at the Directorate in 1999.

Figure 2. Total, Economics and Research Staff of the Deutsche Bundesbank (Directorate)



But also Southern-European central banks, like the *Banca d'Italia* with totally more than 8700 employees and the *Banco de España* with almost 3200 employees, could use some streamlining. As shown in Figures 3 and 4, the total number of employees has been relatively constant during

the period 1990-1999. This holds too for the economics (and research) staff of these central banks.

Figure 3. Total and Economics Staff of the Banca d'Italia

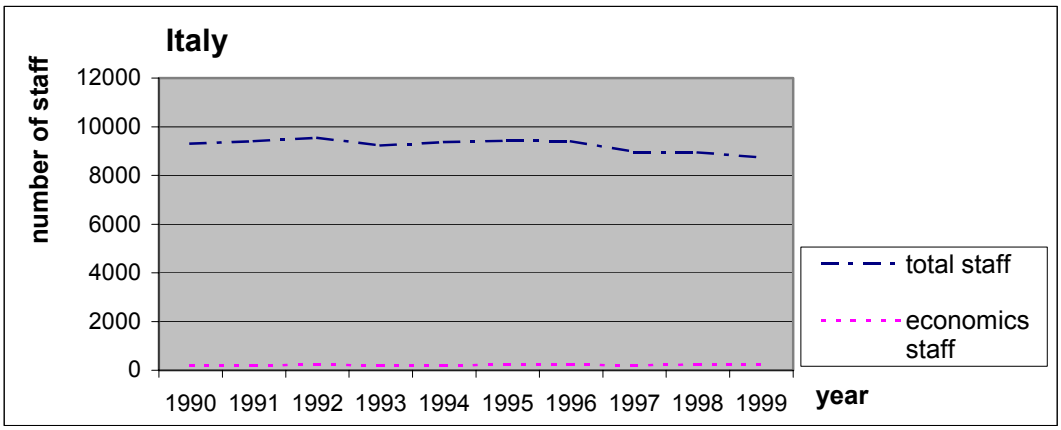
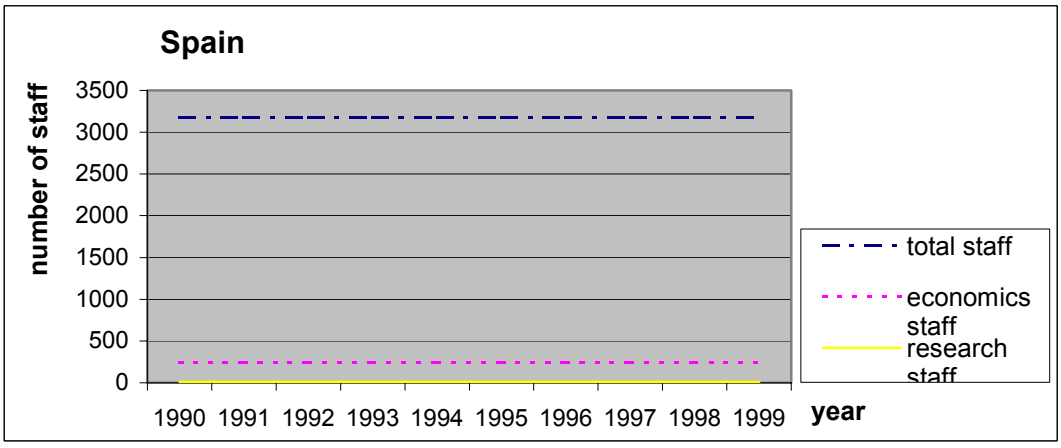


Figure 4. Total, Economics and Research Staff of the Banco de España



They could follow the example of their Scandinavian sisters, like the Finnish and Swedish central banks with respectively 785 and 466 employees in total. These numbers are given in Figures 5 and 6. In Sweden the total staff is strongly decreasing. In both Sweden and Denmark the proportion of the economics and research staff is increasing. Denmark has totally 556 employees as is shown in Figure 7. During the period 1990-1999 one may observe for most central banks a gradual decrease of the total number of employees, while the number of employees at the economics department (and, if existent, the research department) remain rather stable or sometimes even increase slightly.

Figure 5. Total, Economics and Research Staff of the Bank of Finland

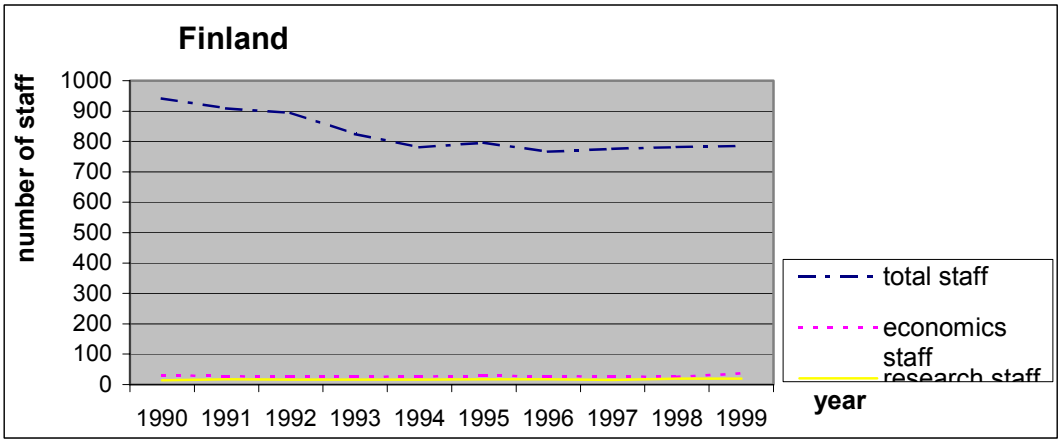
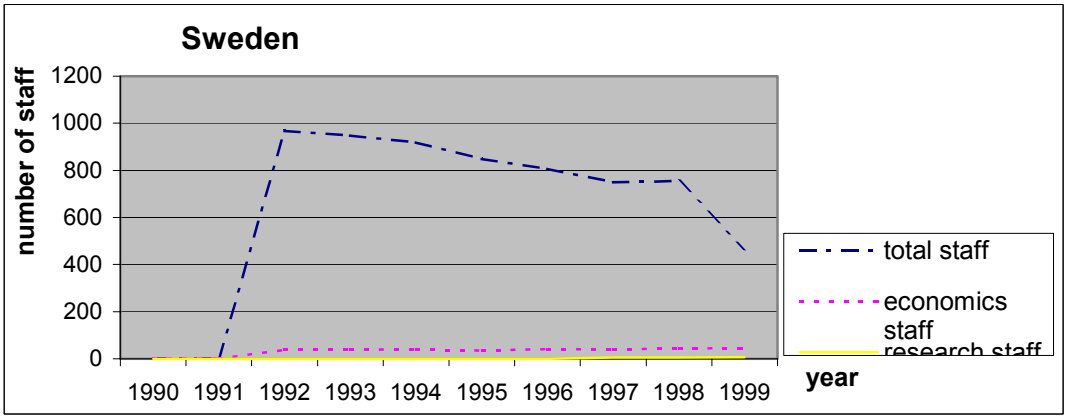
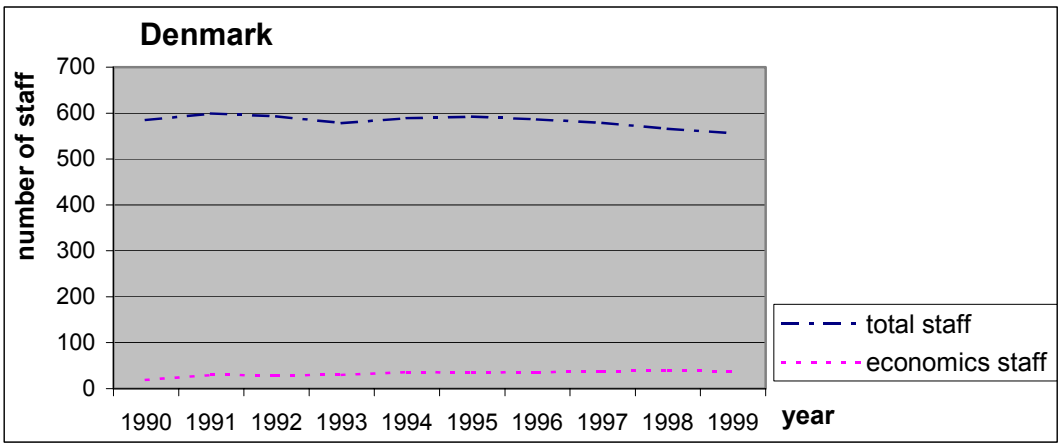


Figure 6. Total, Economics and Research Staff of Sveriges Riksbank



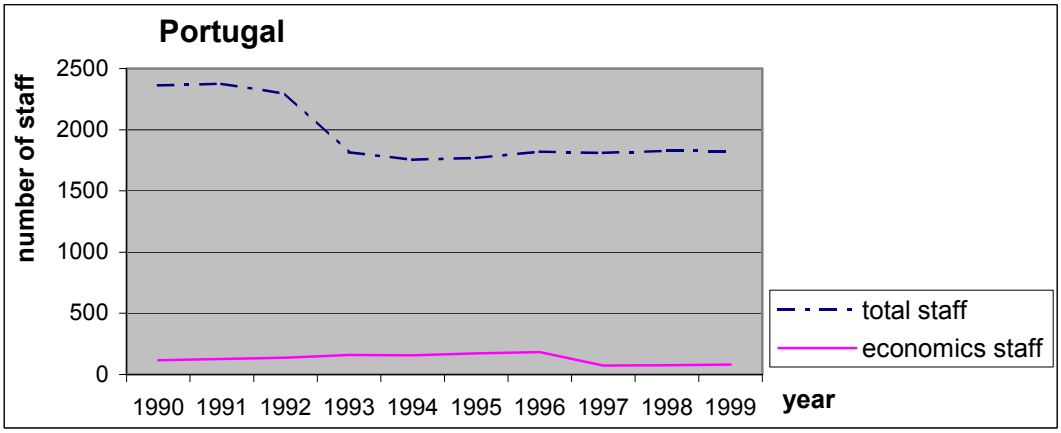
For Sweden only data for the period 1992-1999 were supplied. It is quite remarkable that the total staffing of *Sveriges Riksbank* has become even smaller than that of the Bank of Finland (*Suomen Pankki)* and *Danmarks Nationalbank,* despite the fact that Swedish population is roughly the same as the Finnish and Danish population together.

Figure 7. Total and Economics Staff of Danmarks Nationalbank



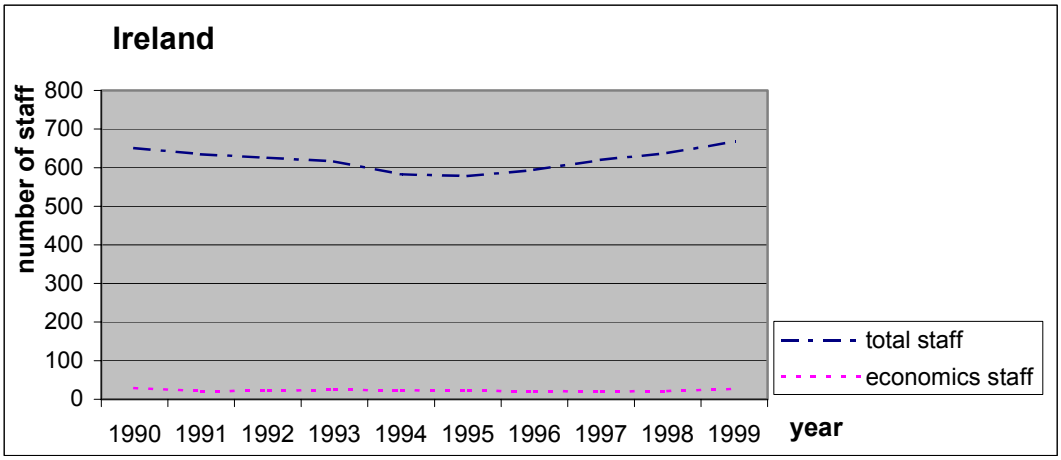
In Portugal both the number of total staff and the number of economics staff decreased in the period 1990-1999, which is shown in Figure 8. In 1999 the total staff of the *Banco de Portugal* was 1826 and its economics staff 82 persons.

Figure 8. Total and Economics Staff of the Banco de Portugal



The Irish central bank has no research staff and its economics staff consisted of 27 people in 1999. Figure 9 gives the total number of staff, which has decreased from 651 in 1990 to 578 in 1995 and risen afterwards up to 668 in 1999.

Figure 9. Total and Economics Staff of the Central Bank of Ireland



The next countries that will be discussed are the three Benelux countries (Belgium, the Netherlands and Luxembourg). The number of employees working at the (very recently established) central bank of Luxembourg has grown in the past few years as one can see in Figure 10. The total staff is consists of only 152 people, which makes the Luxembourg central bank the smallest in the EU. Its very new economics departement has 24 employees and and there is, of course, no separate research departement. The National Bank of Belgium has also no research department. The total staff of the Belgian central bank has decreased from 2917 employees in 1990 to 2449 in 1999. This is shown in Figure 11.

Figure 10. Total and Economics Staff of the Banque Centrale du Luxembourg

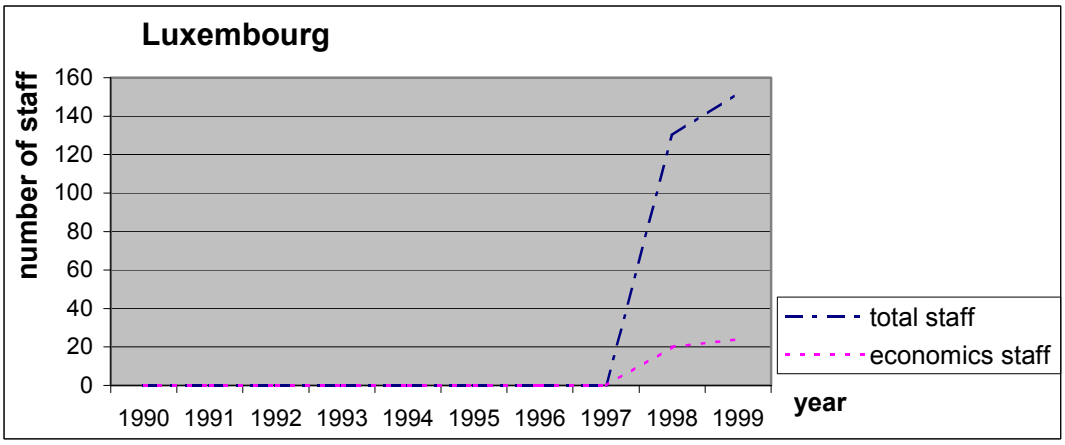
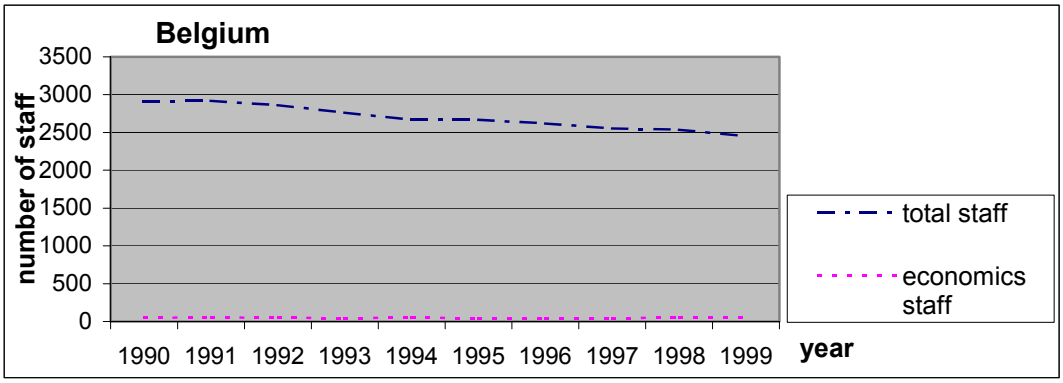
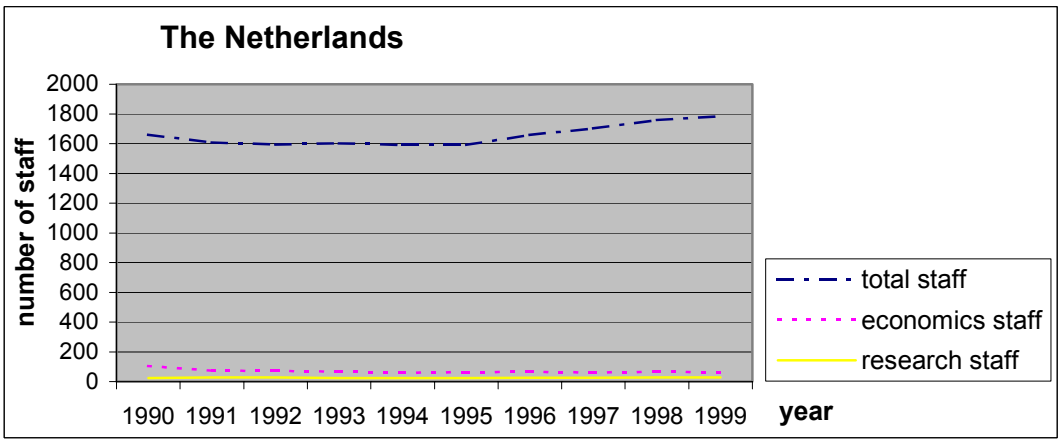


Figure 11. Total and Economics Staff of the National Bank of Belgium



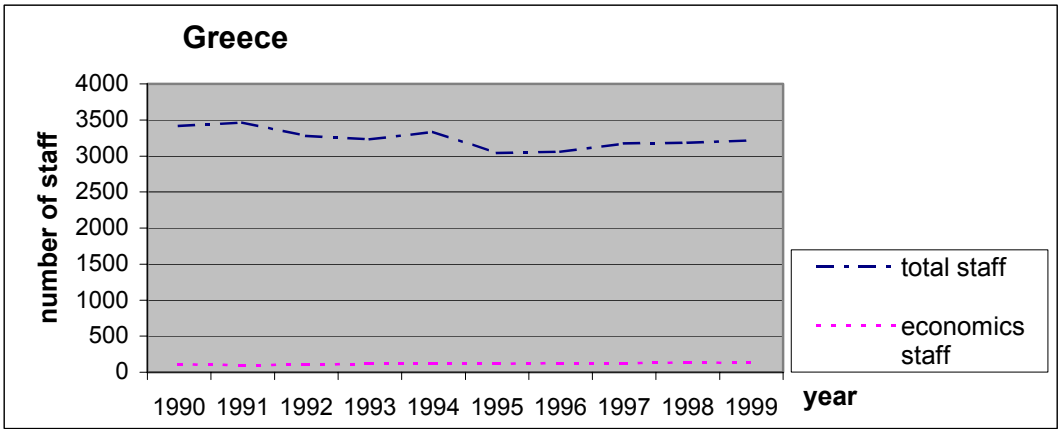
In the Netherlands the total staff of the central bank increased from 1660 employees in 1990 to 1748 in 1999. The economics staff decreased and the research staff increased, which can be seen in Figure 12. It should be mentioned that De Nederlandsche Bank is one of the few national central banks (next to the Central Bank of Ireland) with an increasing number of total employees. Since 1995 its total staffing increased with 192 within four years.

Figure 12. Total, Economics and Research Staff of De Nederlandsche Bank



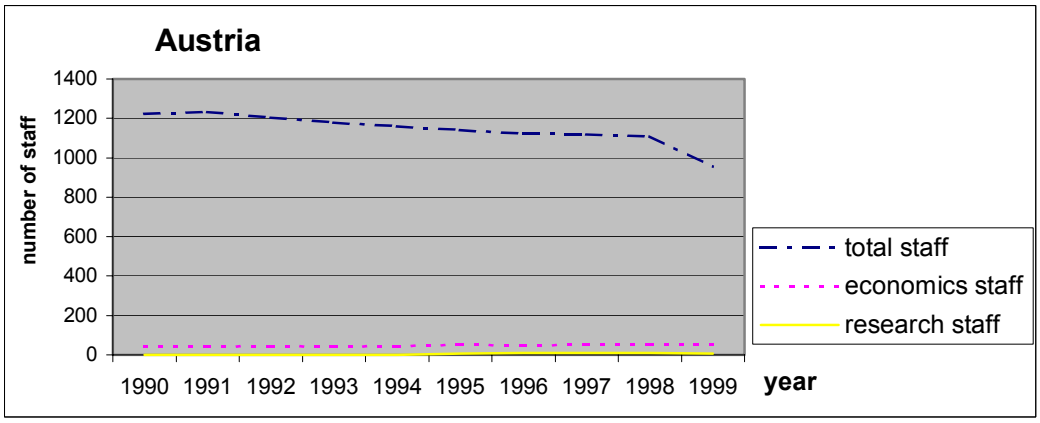
As is reproduced in Figure 13, one may observe that Greece's total number of employees did not change a lot during the period 1990-1999. The Bank of Greece has, like a lot of smaller EU member states, no research department. Its total staffing was 3216 persons and its economics staff consisted of 131 persons in 1999. That implies that the total number of employees of the Bank of Greece is even larger that that of the Bank of Spain, while the Greek population is almost one fourth of the Spanish population.

Figure 13. Total and Economics Staff of the Bank of Greece



The total staffing of the Oesterreichische Nationalbank has decreased by 268 employees from 1223 persons in 1990 to 955 persons in 1999. The central bank of Austria has next to its economics department only since 1995 a separate research department, which is shown in Figure 14. The number of economics and research staff was respectively 52 and 6 persons in 1999. Very recently, the Oesterreichische Nationalbank reduced its total staffing by the outsorcing of its printing works.[10]

Figure 14. Total, Economics and Research Staff of the Oesterreichische Nationalbank



The Bank of England has experienced a strong decrease of its total staff from 5140 employees in 1990 to 2663 employees in 1999, but its economics staff has risen. The Bank of England has as one of the few larger central banks no separate research department. This is a deliberate policy of the Bank of England in orde to mix research and conjunctural activities in one overall department. The largest economics area within the Bank of England is Monetary Analysis with

[10] Therefore, the total staffing of the Austrian National Bank continued to decrease furher in 2000 (954 employees) and 2001 (943 employees).

184 staff of which 83 economists or econometricians in 1999. These developments are shown in Figure 15.

Figure 15. Total and Economics Staff of the Bank of England

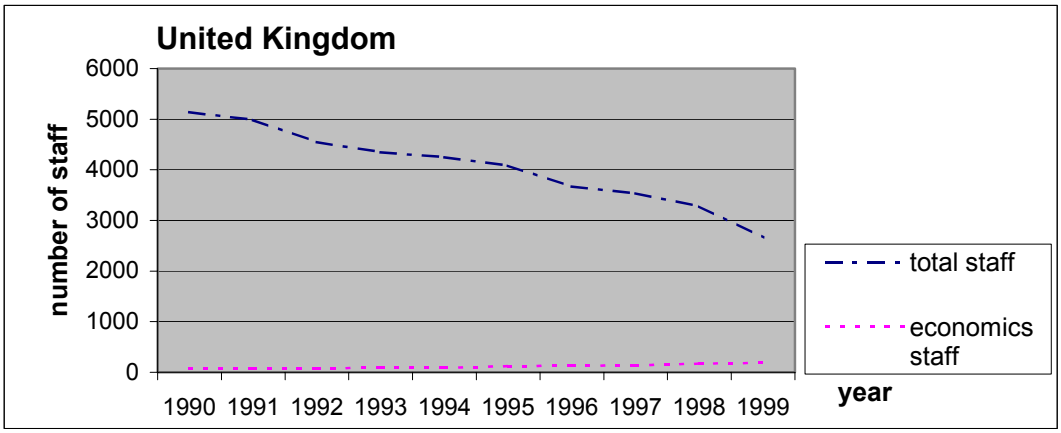


Table 2. The Staff Ratios of the National Central Banks in the European Union.

	Total staff CB / population	Economic staff CB/ population	Research staff CB / population
Belgium	2.50E-04	5.00E-06	0
Germany	3.10E-05	8.65E-07	1.10E-07
Greece	3.02E-04	1.25E-05	0
Spain	8.10E-05	6.09E-06	3.30E-07
France	NA	NA	NA
Ireland	1.69E-04	7.11E-06	0
Italy	1.56E-04	3.96E-06	0
Luxembourg	0	5.56E-05	0
The Netherlands	1.09E-04	3.99E-06	1.77E-06
Austria	1.43E-04	6.42E-06	7.41E-07
Portugal	1.82E-04	8.20E-06	0
Finland	1.51E-04	7.12E-06	3.65E-06
United Kingdom	6.00E-05	3.09E-06	0
Sweden	8.50E-05	5.06E-06	7.87E-07
Denmark	1.10E-04	6.98E-06	0

Source: The ratios are based on the results of the mentioned questionnaire and the World Bank data on population (1999).

In Table 2 the most recent ratios (for 1999) of total staff/population, economic staff/population and research staff/population for the national central banks in the EU are given. These staff ratios show large differences both in terms of total staffing and in economic (and research) staffing for

central banks performing similar functions as the operationals arms of the ESCB.[11] The ECB performs different, strategic functions as the directorate of the ESCB and is, consequently, excluded from this table.
It is clear from Table 2 that especially the central banks of Greece and Belgium have a huge total staff in relation to their population size. The opposite is true for Luxembourg, Germany, the United Kingdom and Sweden. Luxembourg has the highest ratio of economic staff related to population size, while Germany has the lowest. The research staff divided by the population size is the greatest in Finland. In eight of the fifteen countries the research staff is zero. These countries are respectively Belgium, Greece, Ireland, Italy, Luxembourg, Portugal, the United Kingdom and Denmark. In these countries the economic staff of the central banks are conducting also research activities and are mixing research and conjunctural work.[12] Therefore, it is quite essential to relate the research output of the ECB and the national central banks to the sum of the economic staff and, if existent, the research staff of that central bank.

4. The Relevance of Research Activities of Central Banks and Other Institutions

Central banks have a number of functions, ranging from formulation and supervision of monetary policy to supervision of financial institutions. A good research department may be instrumental for performing these functions by assisting in formulating monetary policy. Good research is however a factor of its own for the reputation and credibility of central banks. Although good research is important, the quantity and quality research of central banks and international financial organisations has not been investigated.
An external committee evaluated the research activities of the International Monetary Fund (IMF) and concluded that, although the Fund produces some excellent research products, there was substantial room for improvement in the overall quality of the Fund's research (see IMF, 2000). Furthermore, the mix of research and the link between some of the Fund's research were not optimal. These conclusions were based on an in-depth evaluation of research output of the various departments of the Fund.
Like the IMF, most central banks engage in research activities. There are good reasons why they should. For one thing, central-bank governing councils require information and interpretations of economic situations on which to base their policy decisions. This type of research is mainly policy analysis. However, other types of research can also be helpful - or even essential - for a central bank. As the external examiners of the IMF put it: "Any organisation that relies on old ways of doing things in a changing world will eventually cease to be relevant. There is much still to learn in the field of economic policymaking, and [a central bank] must continue to learn and update its thinking" (IMF, 2000, p. 16).
This does not imply that a central bank should try to produce all the research that is relevant for its needs. Certain areas of research are better left to academia. Still, there are many good reasons why in-house research is essential for a central bank (see also IMF, 2000): (1) staff interested in doing research need to be given the opportunity to conduct research so that a central bank can hire and retain the best economic minds; (2) research is more easily drawn into the process of

[11] It should be mentioned that some national central banks, like De Nederlandsche Bank, are also responsible for banking supervision which function adds to their total staffing.
[12] For most central banks the reason to combine research and conjunctural activities is related to their relative small size. For some central banks, such as the Bank of England, it is a matter of policy not to have a separate research department.

policymaking when the same people that do research are also involved in the policymaking process of the central bank; (3) staff can gain an in-depth intuition from conducting their own research that can be called upon to help in the policy design process; (4) successful in-house research can independently help enhance the credibility and reputation of the central bank.[13]

From the perspective of a regional central bank in a decentralized system of central banks - like the European System of Central Banks – there are additional considerations (see Goodfriend, 1999; Angeloni, 1999).[14] The diversification of research within a system of central banks brings a variety of analytical perspectives to policy deliberations that are invaluable in an increasingly complex economy.[15] Moreover, a system of regional banks harnesses competitive forces to encourage innovative thinking within the central bank.

The remainder of this paper will provide an evaluation of the quantity and quality of the research activities of the central banks of the member countries of the European Union (EU). Quality of research has various dimensions. Research at the central bank can be considered of high quality when it proves to be useful in developing and executing policies of the central bank. This aspect of quality is difficult for outsiders to analyse. Instead, we focus on another indicator for research quality, i.e. whether the research papers have been published in refereed professional journals. In this note we report the outcomes of an investigation based on the frequency of publications in international economics journals. The results are based on a survey of European central banks in which various questions related to research were asked.

The next section, Section 5, briefly outlines the survey and shows the evolution of the relative size of the research departments for the central banks for which this information is available. Then in Section 6 we report on research output in the form of absolute and relative numbers of publications in scientific international economic journals.[16]

5. The Relative Size of Economics and Research Staff of the ECB and National Central Banks in the European Union

All EU central banks were sent a questionnaire in which we asked questions such as: What is the total number of staff employed by the central bank over the period 1990-1999? How many staff is working in the economics and research departments over the period 1990-1999? In which scientific journals did your staff publish papers over 1990-1999? Many, but not all central banks, were willing and able to answer these questions. The answers to this questionnaire form the input for this and the following section.

Table 3 shows the size of respectively the total staff, the economics and research staff, and the ratio between both for the ECB and the national central banks in the EU. The data refer to the average for 1990-1999 or for the period for which data are available. Staff in the economics and

[13] Until the 1960s the research activities within the US Federal Reserve System (Board of Governors and regional Federal Reserve Banks) were poor. In the 1960s the Federal Reserve Bank of St. Louis started to develop research activities (e.g. the *St. Louis equation*) by hiring young, bright economists. Soon after, the Board of Governors and other Federal Reserve Banks also felt the need to develop research activities to influence FOMC policy making. I am grateful to Jürgen von Hagen for making this point.

[14] For a detailed comparison of the ESCB with the Federal Reserve System, see Fase and Vanthoor (2000).

[15] As Goodfriend (1999) points out, within the US Federal Reserve System research departments of reserve banks often develop a specialisation. A reserve bank president may encourage research of one type or another; or a particular economist may make a department strong in a particular sort of research. A bank may also exploit a feature of its regional economy or its operational responsibilities to develop a research advantage.

[16] These sections are heavilly based on Eijffinger, De Haan and Koedijk (2002).

research departments is counted together. A few conclusions can be drawn. First, the absolute size of the European central banks varies considerably (see also Vaubel, 1997). Second, the central banks show considerable divergence in terms of the relative size of the economics and research departments. The ECB has, by far, the highest ratio between the economic and research staff and the total staff. This is, of course, a consequence of the fact that the ECB plays a key role in formulating monetary policy, while national central banks in principle only have operational responsibilities, like conducting money market management and foreign exchange interventions, and research activities to feed their Governor or President in the Governing Council. Some national central banks have other responsibilities too, such as supervision of the financial system. Of the national central banks, the central banks of Spain and Portugal have the highest ratio between economics and research staff and total staff, followed by the central banks of Denmark, the Netherlands, Sweden and Finland. The central banks of Belgium, Germany and Italy have the lowest ratio.

Table 3. The Total Staff and the Economics and Research Staff, 1990-1999 (averages)

Central Bank of:	Total staff:	Economics and Research staff:	Ratio:
Austria	1,243	50	0.041
Belgium	2,695	49	0.018
Denmark	582	33	0.057
Finland	826	45	0.055
France	NA	NA	NA
Germany	2761	69	0.025
Greece	3240	118	0.038
Ireland	621	23	0.037
Italy	9,229	212	0.023
Luxembourg	141	22	0.156
Netherlands	1,655	95	0.057
Portugal	1,966	129	0.067
Spain	3,175	253	0.080
Sweden	807	42	0.056
UK	4,050	116	0.031
ECB	633	110	0.172

Source: Eijffinger, De Haan and Koedijk (2002).

Notes: Data for Luxembourg and the ECB refer to 1998-99; data for Sweden refer to 1992-99. For Portugal the data until 1996 include Statistics staff.

From Figures 1 to 15 we have seen that some central banks increased the relative size of their economics and research staff considerably (notably Sweden and the UK), while others show a more modest increase (Austria, Denmark, Finland, Germany and Greece). Portugal shows a decrease in the relative number of economics staff, which is, however, due to the fact that the figures for 1990 up to 1996 include statistics staff. The Netherlands shows a small but steady decline, while in Belgium, Ireland and Italy the relative size of the economics staff engaged in research remained more or less constant. The figures for the Spanish central bank suggest that both the economics and research staff and the total staff remained the same during the 1990s.

6. The Research Output of European central banks

In this section we look at the research output of the European central banks for the period 1990-1999. As pointed out in the introduction, we measure quality by counting the number of scientific journal publications per employee. Measuring output per employee seems natural as size of the various central banks differs a lot. As there exist considerable quality differences between scientific journals, we apply a weighting scheme. We ranked the selected international journals into three classes: top journal, very good journal and a good journal (see Appendix B in Eijffinger, De Haan and Koedijk (2002) for further details).[17] A top publication delivers three points, a very good publication two points and a good publication one point. We calculated the research output per employee by multiplying the number of journal articles by the respective scores for the journal (either 3, 2 or 1) and dividing the resulting sum by the number of employees. The resulting research output per employee is shown in Table 4.

Table 4. The Weighted Journal Publications per Employee of European Central Banks (including the ECB) for the period 1990-1999.

Central Bank of:	Total number of journal publications:	Quality-weighted number of articles:	Quality-weighted number of articles per economics and research staff:
Austria	14	17	0.34
Belgium	7	9	0.19
Denmark	3	5	0.15
Finland	20	35	0.78
France	NA	NA	NA
Germany	NA	NA	NA
Greece	NA	NA	NA
Ireland	3	4	0.17
Italy	7	19	0.09
Luxembourg	NA	NA	NA
Netherlands	49	68	0.72
Portugal	31	50	0.39
Spain	29	51	0.20
Sweden	5	12	0.24
UK	8	14	0.08
ECB (1994-99)	29	50	0.45
ECB (1998-99)	13	23	0.21

Source: Eijffinger, De Haan and Koedijk (2002).

Notes: Figures for UK and Sweden refer to 1998-99. Figures for the ECB refer to 1994-99 or 1998-99. In the first case the publications of the ECB research staff during 1994-97 (during their previous professional life) were also counted.

[17] Of course, not all international journals can be considered to be top, very good or good journals. These other journals are mostly national-oriented journals or journals that are not refereed according to an objective refereeing process. The list of the Association of Cooperating Dutch Universities (VSNU), which is used for measuring of research output and for allocating research funds among and within Dutch universities, is used as a basis for selecting top (A), very good (B) and good (C) journals.

From Table 4 it becomes clear that the Bank of Finland (*Suomen Pankki*) has the best research performance of European central banks, closely followed by the Dutch central bank. The Finnish central bank has a very active research department with a relatively small staff, which does not only publish in international (top) journals but also on a regular basis organise high level conferences with international research networks such as the National Bureau of Economic Research (NBER) and the Centre of Economic Policy Research (CEPR). Apparently it pays off to have a clear strategy with respect to research. The second place goes to De Nederlandsche Bank. This primarily reflects the strong performance of its research department. This part of the Bank has a strong tradition in applied econometric research and macro-economic modelling. The third place is occupied by the Banco de Portugal, while the fourth place is for the Oesterreichische Nationalbank, which has built a niche with its research focus on Central and Eastern European countries. The fifth place is for the Swedish central bank, while the sixth place goes to the ECB in Frankfurt. However, when we also take the output over the period 1995-98 into account, the ECB occupies the third place, before the Austrian and Portuguese central banks. This is a remarkable achievement. It is clear that the ECB invests a lot in attracting internationally reputed academics, especially for its Directorate-General Research but also for its Directorate-General Economics.

Is there a relationship between the relative priority that a central bank gives to research (i.e. the input) and the quality of research as measured by scientific publications (i.e. output)? Table 5 shows the rankings of the various central banks for which we have information on both input (relative size of the economics and research department) and output (quality-weighted number of publication per employee). It follows that there is only a weak relationship between input in terms of relative size of economics and research staff and output in terms of international scientific publications.[18] Apparently, if you do not have as a central bank the argument of strength, you do need to have the strength of the argument. In other words, other factors than the relative size of the economics and research departments determine the quality of the research output of central banks. It is quite remarkable that central banks of small countries (in terms of inhabitants) have such a relative good research performance.[19] Possibly, there is an incentive for them to increase their weight in the decision-making process through a reputation of high-quality research. An alternative factor that comes to mind is these central banks' general attitude towards openness and, hence, interaction with the national and international academic world.

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[18] This outcome seems in line with the theory of bureaucracy that predicts larger bureaucratic structures will be less effective per person in producing output. See Niskanen (1971).

[19] After we had finished our research we also received information on the scientific publications of the Swiss central bank, the Schweizerische Nationalbank, which confirms this conclusion.

Table 5. Rankings of Relative Size and Quaility-Weighted Research Output Ratios

Central Bank of:	Ranking relative size of economics and research departments (input):	Ranking quality-weighted number of articles per economics and research staff (output):
Austria	8	4
Belgium	12	8
Denmark	5	10
Finland	7	1
Ireland	9	9
Italy	11	11
Netherlands	4	2
Portugal	3	3
Spain	2	7
Sweden	6	5
UK	10	12
ECB (1998-99)	1	6

Source: Eijffinger, De Haan and Koedijk (2002).

7. Conclusions

In this paper we have analysed the ESCB as a federal central bank system. First, the degree of decentralization of the ESCB has been briefly compared with its predecessor, the Deutsche Bundesbank, and its counterweight in the US, the Federal Reserve System. Moreover, the development during the period 1990-99 of the total, economics and research staffing of the ECB and the national central banks in the EU is investigated and also the staff ratios of the national central banks in 1999. Furthermore, the research activities of the central banks in the European Union over the period 1990-99 are analysed both in terms of input (economics and research staff) and output (quaility-weighted number of articles in scientific journals). The share of economics research staff in total staff of the national central banks varies between 0.02 and 0.17. The ECB has the highest ratio between economists and researchers and other staff. A ranking of research performance based on the quality-weighted number of scientific articles per economics and research employee reveals that the Bank of Finland has the best research performance of European central banks, followed by De Nederlandsche Bank, the Banco de Portugal and the Oesterreichische Nationalbank. There is only a weak relationship between the research performance and the share of research staff. The conclusion "small is beautiful" also seems to hold for the economics and research departments of the European central banks. Again, if you do not have as a small national central bank the argument of strength, you do need to have the strength of the argument.

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Discussion

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- I would like to thank the organisers first, for putting together such a fine variety of papers to discuss what I consider to be a most relevant topic: the experience gained by the European Monetary Union and the potential prospects for other regions of the world. And second, for inviting me to discuss a paper as thought-provoking as that presented by professor Eijffinger.

- I shall commence by commenting on Eijffinger's results on the research performance at the ESCB. Then I will move to the more general issue of the functioning of the Eurosystem, which Eijffinger's paper covers very broadly, considering the role I think the economics and research departments of the national central banks should play.

- I am deeply convinced of the usefulness of economic research on the design and implementation of monetary policy. As central bankers we need at this stage to promote economic research to broaden our knowledge of the euro-area economy. This will also enhance the reputation and credibility of the Eurosystem. Moreover, research activities must be of the highest possible quality and, to that end, we need rigorous evaluation processes.

- Nevertheless, the two statistics considered in this paper, the relative size of the economics and research staff and the relative weight of journal publications, do not suffice for me to evaluate properly the quality of the research activities of central banks. We are comparing highly heterogeneous institutions. Not only the functions for which each central bank is responsible should be taken into account (the most obvious example is banking supervision) but also the responsibilities of each economics department. It is not a simple division between

conjunctural and research activities, as the author thinks, that may also come into play. But the organisational structures that include 'doing research' usually cover other activities. For example, statistics, communication with the ECB or other international institutions, publications and language services, computer and library services may, in some cases, come under the economic and research bodies. Since this possible bias may be correlated with the size of the central bank, I am not surprised that the ranking of quality supports the conclusion that "small is beautiful".

- When considering the organisation of the ESCB, professor Eijffinger compares the Governing Council voting system and the relative size of the ECB/ESCB with the Federal Reserve System and the Deutsche Bundesbank. He concludes that both aspects indicate the over-representation of the national central banks. But the past experience of the institutions making up the Eurosystem and the fact that it is their constituencies who assess their performance cannot be forgotten. In the case of the Eurosystem, some of the principles guiding decision-making are based on the distinctive multi-country nature of the euro area.

- The ESCB is a newly created institution with a federal system, and its design has been based on similar principles to those implemented by the Federal Reserve. These are a long-term commitment to price stability, the independence of their government bodies and, finally, the accountability and transparency of its policy strategy. But as a means of retaining a balance between these principles, the existence of sovereign states and the need for the Eurosystem to act as a single and unified decision-making entity, it was decided to establish a one-person-one-vote principle in the Governing Council.

- Some critics have noted that the ESCB's decision-making process entails the risk that regional (national) considerations may prevail in policy decisions. Rather, I think that since January 1999 we have observed some divergences in the economic performance of the European countries and that monetary policy actions have been guided by the performance of the overall euro area. Naturally, in the future, the decision-making bodies must be adapted to the enlargement process in order to preserve efficiency principles. That will probably require reforms in the voting procedure on the basis of the Nice agreement, following a representativeness rule but retaining the principle of 'one member, one vote'. The extent to which this reform is made consistently and appropriately (in accompaniment of economic and monetary union) will also have a significant impact on monetary policy credibility.

- For an example of this new and complex ESCB framework, we must think of the new functions actually being performed by the economics and research departments of the NCBs. For one thing, the differences in euro-area economic structures pose difficulties for obtaining a clear picture of overall economic developments and how the transmission of monetary and non-monetary shocks operates. In this context, the NCBs currently play a pivotal role gathering and analysing information for the proper assessment of the monetary policy in the euro zone. For example, the contribution of the economics departments is particularly important in the production of the ECB's macroeconomic forecasts and in analysing the economic policies that remain decentralised, such as fiscal policies and wage-setting procedures.

- For another, the NCBs are responsible for explaining the implications for the national economies of decisions taken at the euro-area level. National central banks should be the

voice of the Eurosystem as regards the specific situation and problems of each national economy to their economic agents.

- Moreover, the economics departments of the NCBs have to follow continuously the current economic conditions and give a public opinion about how the monetary policy stance interacts with the non-monetary policies that remain under the sovereignty of the national economies. This is more relevant for those countries for which there are not other public or private agencies making a regular analysis of its corresponding macroeconomic performance.

- Finally, let me say that if there is an area in which decentralisation has clear advantages and best reflects the functioning of the ESCB is on research activities. Competition among institutions will incentive new ideas and results, enhancing the quality of our decision process. Moreover, being part of the Eurosystem does not exclude the existence of idiosyncratic economic policy issues that must be incorporated into the research agenda of each national central bank. An example is that the existence of a monetary union obliges us to inquire into the possible causes of real and financial regional imbalances and the best policy to implement in each case. Another example is that in a monetary union the concept of aggregate competitiveness is not only a matter of relative prices and costs but also of analysing concepts more related to the long-run growth performance, such as the degree of sectoral competitiveness, specialisation or research and development activities. This is why I think, more than ever, each central bank needs to have its own research agenda.

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First of all I want to thank the organizers of this conference for offering me the possibility to discuss the enlightening paper of Sylvester. But maybe I am also determined to discuss such a paper as I worked in one of the central banks which he evaluated. Let me structure my comments into three parts: the first shortly repeats what the paper does in concentrating on some very specific points. The second explains what the paper does not, but what I would have expected. And the third raises some open questions and makes some suggestions for further research in the spirit of the paper. Overall, I will raise more questions than presenting answers.

1. What the paper does

As regards the institutional setting Sylvester greatly appreciates the decision taken by the Eurosystem at the end of last year to reduce the general frequency of monetary policy decisions to one per month. In his view this enhances the forecastability of money market rates and mitigates their volatiltity. This is a point not very convincing to me as, a priori, there is no clear-cut relationship between the predictability of interest rates and the frequency of monetary policy decisions is not. On the other hand, Sylvester criticizes the degree of decentralization of the Eurosystem of being too high as regards the voting system and the size of the staff. Concerning the latter, he argues that in general a trimming down of the National Central Banks (NCBs) is unavoidable, but economics and research staff should increase. Currently, there are not only large differences in total staff per population ratios, but also for economics and research. Spain and Portugal have the highest, Germany and Italy the lowest ratios of economics/research staff to total staff. The main part of the paper consists of the presentation of a survey of EU central banks on their research quality. Research quality is measured by publications (per employee) in refereed journals (3 classes) in the 1990s. The results are surprising in the sense that the smaller central banks perform best (Suomen Pankki and De Nederlandsche Bank). Furthermore, there is only a weak input-output relationship based on staff size. The reasons for this may be found in the different incentive structures and the greater openness of these NCBs.

2. What the paper does not

With respect to the voting mechanism I miss a discussion of the problems related to EU and EMU enlargement. With up to 12 new members entering EU and EMU in the first decade of the 21st century the current procedures (one vote for each board member and for each NCB) cease to be feasible. As you all surely know the ECB and the EU Commission are working on a proposal for changing this mechanism. There would have been several topics to be discussed (see e.g. Ruckriegel/Seitz, 2002): Should there be a rotation principle? Should the votes of the Board members be the decisive ones? Are the Federal Reserve System and the former Bundesbank a benchmark for this decision?

I would also have expected some analysis of the situation since the beginning of the common monetary policy for EMU. Especially interesting would be whether the monetary policy decisions of the Eurosystem were based on the euro area as a whole or not (see Meade/Sheets, 2002, for the case of the Fed)? Remember for instance the first interest rate decision of the ECB of April 1999 to lower rates which could only be justified with reference to the economic situation in Germany and Italy. Moreover, if national developments are important one may ask which countries are the relevant ones and whether it is the voting behaviour of the Board members or that of the Presidents of the NCBs which reveals the importance of national developments? In answering these and related questions it is also necessary to take into account that for markets the policy results matter, not the divergences in the voting behaviour. And finally it would be interesting to analyze which institutional structure fosters a warranted "denationalisation of monetary policy"?

Let me also make a few remarks on the division of labour between the ECB and the NCBs within the Eurosystem. For example, does it make sense for the NCBs to specialize on certain topics as is the case for some Federal Reserve Banks in the US. According to which criteria should this decision be made? And which role should the ECB play in such a system? The division of labour is also related to the division of information between then ECB and the NCBs. The decisive question here is who gets and who should get which informations? Currently, I sometimes have the impression that the position of the NCBs is too strong in this respect. In general, the Eurosystem has to find a balance between centralized decision-making and decentralized implementation by NCBs (see Lannoo/Gros, 1998). This split may hinder or favour the integration of (financial) markets.

3. Open questions and suggestions for further research

The quality of the research and economics staff of central banks is only one aspect. The quality of the central banks in general and their monetary policies is another. If there is a positive relationship (what I hope), one may ask whether it is stable over time. In dealing with these two aspects it is in any case necessary to cope with the situation of the Deutsche Bundesbank. What does the monetary policy reputation and success of the Bundesbank mean against the background of the relatively low research output as measured in the paper? Is there perhaps a trade-off between successful monetary policy and successful research and between openness/transparency (which kind?) and reputation (Schich/Seitz, 2000)? Against this background it has to be taken into account that research is not only undertaken in research and economics departments, but also in banking, statistics, international, operations, etc. Furthermore, it was the agreed-upon internal "policy" of some NCBs (especially of the Bundesbank) until the mid 90s not to publish with the personal name of the authors but only with the name of the institution.

This leads us to the question which research topics should be on the agenda of central banks and how research should be organized at central banks, especially in a monetary union (see e.g. Hefeker, 2001). Is it only monetary theory and policy or all fields of economics? Finally, as in every time series analysis, possible structural breaks have to be considered. In many empirical papers dealing with monetary policy of the Eurosystem you can find a disclaimer in the very last paragraphs which states that the results should be interpreted with caution as they are based to a large part on data before 1999, i.e. a time where there were still national monetary policies in the euro area. This may also be an important factor with respect to the question of research quality. The Eurosystem is only existent since 1999. And we all know: THE TIMES THEY ARE A-CHANGIN'!! Competition between the NCBs on the one side and the ECB on the other has certainly increased since 1999. And one part of this competition is necessarily on the field of research. In other words, it may very well be that the past results are only a poor predictor of the future.

Despite these critical remarks I cannot help expressing my respect for the effort Sylvester has undertaken in preparing his paper and for the precise and brilliant writing of it.

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