EMU convergence and the structure of social protection financing

Robert HAGFORS

Research and Development Centre
The Social Insurance Institution
Finland
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By

Robert Hagfors

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Abstract

After a period of convergence among the euro area economies, recent evidence suggests that some divergence may have happened. The purpose of this article is first to examine the convergence or divergence behaviour of some key economic indicators across euro area countries since the early 1990s. The second aim is to study the development of the structure of social protection financing at the main contributor level. Here the year 1993 has been selected as a reference year for studying the possible changes in the convergence of the structure of social protection financing between two periods. Based on these two exercises the final aim is to arrive at conclusions about possible parallelism in the development paths of the euro area economies and the structure of social protection financing since the Maastricht Treaty.

The results indicate that while the economies converged generally because the states were preparing themselves for the third stage of the Economic and Monetary Union, some divergence has appeared in recent years on certain monetary policy indicators. On the other hand the divergence of the structure of social protection financing increased significantly during the same period and it appears that the structure of social protection financing is following a different pathway than the main economic indicators.

Robert Hagfors
Research Officer
Research and Development Centre
The Social Insurance Institution, Finland
P.O. Box 450
FIN-00101 HELSINKI
FINLAND
e-mail: robert.hagfors@kela.memonet.fi
1. Introduction

At the end of the Finnish presidency of the European Union the debate concerning social protection in the EU was given an equal status to the debate on macroeconomics and employment. Though social policy decision making remains at the member state level, the development of the economic integration has an indirect effect on the practice of social policy via several channels. From the point of view of social research the start of stage three of Economic and Monetary Union is therefore especially interesting and challenging.

Criticism of the monetary integration in Europe is usually based on two main arguments: the conditions for an optimal currency area may not prevail and there are undesirable differences in the effects of the single monetary policy because the economic and financial structures in the member states are heterogeneous. In addition there may be a conflict between the local and area-wide decision making of the European Central Bank. (See Angeloni and Dedola 1999.)

In order to test these assumptions, both longer-term trends and cyclical variations of central economic indicators need naturally to be monitored and separated, as both of them reflect economic performance. An analysis, along with the trends of some key indicators from 1970 on, can be found in a report by European Central Bank, ECB (1999). During the thirty years period there seems to have been a greater degree of similarity in the cyclical development of the economic growth rates in euro area countries than what is observed for trend growth rates (ECB 1999, p. 40). This may, for example for a country like Ireland, reflect the catching up process of lower income countries. One factor explaining the high synchronisation of cycles is of course the oil price shocks, which the countries met at the same time.\(^1\) The trends of growth rates of employment were, on average, different in larger countries than in smaller ones and the growth rates have been more divergent in recent years. Finally, as a result of the convergence criteria for Economic and Monetary Union (EMU) and the consistent monetary policy, the price increases have shown convergence at a low level. However, in the past two years the synchronisation of price increases has decreased. (ECB 1999, p. 50.)

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\(^1\) The degree of synchronisation was measured with the correlation coefficients of cyclical components of GDP growth in individual countries with those for the whole euro area.
There are differing opinions as to, whether the conditions for an optimum currency area are satisfied. In a recent research report Angeloni and Dedola (1999) present empirical evidence for the fulfilment of the conditions. However, the issue is still open to some extent, especially as after a period of convergence of the euro area economies, recent evidence suggests that some divergence may have happened, which brings up the question as to whether this will be a cause for concern. (Björkstén and Syrjänen 1999.)

In this article we examine first the development of some key economic indicators of the euro area countries since the early 1980s. A closer look at possible convergence or divergence behaviour was made in the period 1993-1999, during which the euro area countries adjusted their economies to stage three of EMU. Our basic idea is to present here the development of the main economic indicators assumed to have an impact on social protection and social policy. This impact has been described often as a double-chain reaction with conflicting effects. (See Pakaslahti 1996, 1999, Pochet and Vanhercke 1999.) In the long run the effects of EMU on social policy will according to Alho and Kaseva (1999, p. 37) arise from increasing productivity, a decreasing real interest rate, increasing competition among countries and increasing tax competition. Whether the net effect will in the end be negative or positive is uncertain, though the authors envisage to a mild positive effect on employment. We will not take a long run approach here, but will instead proceed by applying the dual-chain process.

Following Pochet and Vanhercke (1999) we can describe the two impact chains. First, the Maastricht Treaty and the Stability and Growth Pact require budget consolidation leading to cuts in public spending. Second, given the need to stabilise the price development, monetary policies will be tight, depressing economic activity and leading to extra pressure on social budgets. As a consequence, new spending priorities will be applied and there will be changes in funding mechanisms. These two have a lasting impact to social protection and social policy. The other chain assumes that EMU creates economic circumstances in which improvements in efficiency promote economic growth, leading to increases in income formation and in this way to additional resources becoming available. This again affects spending priorities and funding mechanisms and finally social protection and social policy.

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2 Angeloni and Dedola analyse the correlations of output and prices, which are also computed under demand and supply shocks using VAR methodology. They also estimate central bank reaction functions for testing common monetary policy assumptions.
In this article we do not take the last step to the impact on social protection, but will instead remain at the previous stage. There both chains were assumed to produce changes in the funding mechanism, that is in the financing of social protection. We consider these changes in funding mechanism as changes in the structure of financing social protection. The structure of financing is here defined at the main contributor level, as in Hagfors (1996, 1999a).

We can now ask the following questions: If the economic development, described in terms of some key indicators, reveals a convergence in the economic performance of the euro area countries, does it follow that also the structure of social protection financing is converging; and vice versa? Or could the discrepancies in economic performance and the financing structure be moving in different directions? Does the period matter? In Hagfors (1999a) moderate convergence of the financing structure was found to have occurred in 1980-1995. Does this result remain valid after the period has been divided into two sub-periods, 1980-1992 and 1993-1999? The final aim is therefore to arrive at conclusions about possible parallelism in the economic development paths of the euro area economies and the structure of social protection financing since the Maastricht Treaty.

We proceed in this article by describing in the next chapter the dispersion behaviour of some key economic indicators. This is done by presenting graphically the annual time series for the period 1980-1999. For a shorter period, 1993-1999, we shall present so-called Tukey boxes which allow us to study the dispersion behaviour of the corresponding indicators. To get an overall picture of the economic convergence we present some conventionalised pentagon figures, which describe the average relative convergence of the economies.

In the third chapter we define the main financing sources, the financing shares, and describe their country-specific structural development. Because of some problems with the availability of the data, we have extended the research period by making forecasts for the financing structure in the euro area countries for the years 1996-1999. We are using OECD forecasts as predictive information and population shares as a weighting factor in the averaging process.

The classical convergence analysis is performed in the fourth chapter. This approach is based on the assumption that if the share of a particular financing share is in a certain country initially low but increases faster than in countries where it is initially at a higher level, the shares are converging. This analysis is repeated for two periods, before and after the adjustment to EMU.
In the final chapter we shall compare the dispersion behaviour of economic performance and the structure of the social protection financing with a view to answering the questions raised in this introductory chapter.

2. Dispersion of the Euro area economies

The character of the dispersion of the economic performance of the euro area economies is described here using three generally applied economic indicators, i.e. real annual growth rate of GDP, the unemployment rate (rather than the more commonly used employment rate) and annual changes in consumer prices. These indicators play an important role in the evaluation of the economic situation across the euro area countries (ECB 1999). The indicators also fit well into the double chain framework, which we are using here as the basis of analysis. The research period is 1980-1999 and the main economic background data comes from the June 1998 issue of OECD Economic Outlook. This means, that the observations for the years 1998 and 1999 are forecasts made by the OECD. Let us first consider the growth rate development and the labour market stability across the euro area. Figure 1 presents the GDP growth rates of the eleven countries since the early 1980's to the end of 1990's. A reference line has been drawn to the year 1993 to illustrate the beginning of the adjustment period for the third stage of EMU.

Figure 1. Real GDP growth rates in euro area countries 1982-1999. Annual percentage changes.
From a longer perspective, since the beginning of the 1970's, there have been three main economic cycles in the euro area countries. Economic slowdowns occurred midway through the 1970's, at the beginning of the 1980's and in the early 1990's. The last two can be seen in figure 1. The convergence of growth rates was remarkable already before the oil price shocks. The subsequent decrease in the growth rates increased the convergence until the beginning of the 1990's, at which point the growth rates seem to become more divergent. Next we shall take the convergence in the period 1993-1999 into closer examination. This is done with a Tukey box-and-whiskers diagram, where the level and the dispersion can be observed simultaneously. (See Quah 1997).

The diagram describes how the central tendencies of a distribution vary during the research period. The line in the box locates the median. The edges of the box mark the 25th and 75th percentiles, so that the height of the box is the interquartile range, containing 50% of observations. The vertical lines (whiskers) contain observations which are less than 1.5 times the interquartile range. If the observation is more than 3 times the length of the box below the lower whisker or above the upper whisker, it is called an extreme value. If the values are between 1.5 and 3 times the height of the box, the observation is called an outlier. The box diagram of the annual growth rates in 1993-1999 is presented in figure 2.

**Figure 2. Dispersion of annual GDP growth rates in euro area countries in 1993-1999.**

In figure 2 we can see how the median growth rate was negative in 1993. After that growth has accelerated by around two per cent. There are outliers including Luxembourg, Ireland and some others in 1993, but later exceptionally high growth rates were seen in Ireland and Finland. In Ireland
the growth may be explained by the catching-up hypothesis, while in Finland the recession in the beginning of the 1990's was exceptionally severe. (On the catching-up hypothesis, see Tyrväinen 1998.) If we now look at how the main group of countries is concentrated around the median, we see that the dispersion increased slightly in 1993-1996. It is also obvious from the figure that there was convergence between 1997 and 1999. It should be noticed, however, that this result is conditional on the forecasts made by OECD for the years 1998 and 1999.

In order to describe the economic performance for the purposes of this study we turn next to the labour market behaviour of the euro area countries. In the double chain approach of the EMU effects on the social protection financing, the stabilisation and efficiency considerations had an important role in creating a more stable macroeconomic environment. One factor affecting development in this respect may be the inflexibility of the labour markets. Where there was a divergence of trends among the larger countries during the past decade, it was possibly the result of delayed reforms aimed at reducing labour market rigidities. (ECB 1999, p. 43). An opposing opinion concerning the role of labour market flexibility and the effects of EMU can be found in Pochet and Vanhercke (1999, p. 152). The unemployment rates in 1980-1999 are presented in figure 3.

**Figure 3. Unemployment rates in euro area countries 1980-1999.**

While the unemployment rates were generally under 5 per cent in the 1970’s, according to figure 3 the rates seem to have varied more since then. However, except for Spain and Ireland the rates stayed at relatively stabilised levels until the economic crises of the 1990’s, when they increased in
most countries, rising especially rapidly in Finland. The general feature of development after the 1993 reference year seems to be a decreasing trend. To see whether this is a result of increasing flexibility in the labour markets would require an analysis of labour market rigidity indicators (as in Bjökestén and Syrjänen 1999, p. 24) which will not be attempted here. Instead we shall concentrate on the convergence of the unemployment rates, and will for that reason next present figure 4, where the unemployment rates of the years 1993-1999 are plotted to a Tukey box diagram.

Figure 4. Dispersion of annual unemployment rates in euro area countries in 1993-1999.

The pathway of convergence in the unemployment rates can be seen clearly in figure 4. The median level reached a turning point in 1997, and the rates started to converge faster than in the previous years. Outliers on the lower and upper side of the median respectively are Luxembourg and Finland, whose unemployment rate has in recent years converged to the median level. Spain remains in this context an extreme case.

It is possible that the unemployment rate (or rather the changes in it) are a proper indicator of the labour market rigidity, and in this way have a potential effect on wages. Whether the wage development has a significant effect on price stability depends on productivity trends.

Within the context of EMU’s impact on social protection and social policy, one factor which produces changes in the financing mechanisms are the criteria concerning deficits, debts and inflation. The Stability and Growth Pact (Amsterdam 1997) contains regulations concerning excessive deficits and government financial positions. The member states are also obliged to draw up stability programmes, which in the double chain framework for the impacts of EMU, is assumed to lead to cuts in public spending and consequently to changes in the structure of social protection financing. The stability of prices affects, on the other hand, also the other chain of impact. Because price stability improves the transparency of the price mechanism, it has a positive effect on the economic environment, which is necessary for efficiency. By minimising risks and lowering long run interest rates it helps to stimulate investments and growth.³ By this logic the maintenance of

price stability also contributes to achieving output and employment goals and in this way justifies the practice of a common monetary policy.

The annual changes of consumer prices in the euro area between 1982 and 1999 is presented in figure 5. The price increases varied considerably in the beginning of the 1980's due to reasons such as the application of country specific monetary policies, different currency regimes and most likely differences in the long run productivity reflecting the catching-up processes. This may be the case with Portugal for instance. In the study period the price increase trends have been converging, stabilising to the low level. The convergence continued until 1995, when some divergence seems to have happened. In figure 6 we can take a closer look at the convergence behaviour of the price increases in the convergence criterion period 1993-1999.

Figure 5.  Consumer price increases in the euro area in 1982-1999.

In figure 6 the divergence in 1995 can be clearly observed, as can be the convergence of the price increases which continued after that. After the Amsterdam Pact the convergence continued, but some divergence again appears in the last two years. Whether this development will be harmful for the implementation of a common monetary policy by the European Central Bank naturally depends on the future development of prices in the euro area.

We have now studied the convergence behaviour of the main economic indicators, which are usually used to get a picture of the economic performance of countries. We have also tried to link these indicators to the double chain framework which is used for estimating the impact of EMU on social protection and social policy. We will next see if, by using some economic indicators and average relative changes, we can complete our picture of the convergence of economies in the euro area.
In order to get a better description of the economic environment and its development from the point of view of social protection financing we here present a modified version of the convergence barometer developed by the Bank of Finland in 1999. While the euro area convergence barometer is sophisticated in other respects, it is used for comparing the one time point convergence or divergence of the euro area countries concerned to the weighted euro area average. In our modification we have five dimensions (a pentagon), and we compare the relative changes of the weighted euro area averages between two different time points. We present a pentagon of relative changes of some economic indicators in the periods 1980-1993 and 1993-1999 in panels 1 and 2 in figure 7.

The choice of indicators for the pentagon of relative changes has been made according to the emphasis put on the impact on the structure of social protection financing. The importance of gross tax rate and gross debt rate as austerity measures affecting the financing mechanism mainly by cutting public spending is obvious in the double chain framework applied in this study. In the same framework unemployment rate affects the financing structure of social protection as a part of macroeconomic stability. The statistical significance of the effects of these three indicators on the

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4 The barometer constructed by the Bank of Finland has six dimensions: inflation, unemployment, GDP growth, expansion of domestic credit, fiscal balance and debt/GDP. See Björkstén and Syrjänen 1999.

5 In constructing the euro area barometer Björkstén and Syrjänen present Eurostat's EU-11 average harmonised index of consumer prices. We are here using population shares as country weights. The differences are relatively small.
structure of social protection financing has been confirmed in a pooled cross section and time series analysis by Hagfors (1996). In an economic integration process like that of the European Union, it is obvious that the deepening of the common markets will be reflected as an increasing openness of the economies. Openness is here measured as the relation of the sum of exports and imports to GDP, and the significance of this indicator to the structure of social protection financing has been studied by Hagfors (1999b). Finally, the fifth dimension of the pentagon, rate of interest (here short run) reflects the common monetary policy practised in order to fulfil the conditions of EMU membership.

Figure 7. Pentagon of relative changes of some economic indicators in the periods 1980-1993 (panel 1) and 1993-1999 (panel 2). Averages weighted by population shares.

Panel 1.

Panel 2.
According to the first panel of figure 7 there have been remarkable changes in the economic environment in the period 1980-1993. The grey pentagon presents the situation in 1980 with all indicators standardised to unity. The black polygon presents the situation in 1993 relatively to the 1980 standardised situation. The changes can be estimated by comparing the shapes of the pentagon and polygon to each other. It looks like the biggest changes during the first period have occurred in the increases in debt ratios and unemployment rates in the euro area on the average. In the beginning of the 1980's the unemployment rate was 5.3 per cent being 11 per cent in 1993. The rate of interest was 12.1 in 1980 and 8.7 in 1993.

What kind of conclusions on the development of convergence can we draw from the panels 1 and 2? It seems that the economies, described by some indicators relevant from the social protection financing point of view, have experienced larger relative changes in the previous than in the latter period. In panel 2 the polygon of the year 1993 has now been standardised as a grey pentagon. The relative situation of the year 1999 is presented as a black polygon and allows, in this way, estimations of the relative changes. The average development of the economic situation seems to be quite different from that of the previous period.

Tax rate remained at a high level in the latter period, while the rate was increasing in the previous period. The debt ratio continued to increase in the latter period and it was five percentage units higher in 1999 than in 1993. Unemployment rate remained approximately unchanged and openness increased significantly during the latter period, which probably partly was a result of the enlargement process of the EU in 1995. The indicator that underwent a large relative decrease was the rate of interest, which reflects the monetary policy practised by individual states as they were adjusting to the third stage of EMU, and later by the ECB.

This is partly explained by the choice of time period, but the convergence of the economies in the latter period seems to be a fact. If we estimate the forms of the average pentagons for, say, the next five years, they will probably resemble each other, except that the latter polygon cottage has a higher roof. The general conclusion here is that the economies of the euro area diverged in the period 1980-1993, but that the development turned to a convergence in the period 1993-1999.
3. Main financing sources

In order to describe the structure of the financing of social protection at main contributor level some descriptions of the data have to be made. The social protection financing data used in this article come from the EUROSTAT publication *Social Protection Expenditure and Receipts 1980-1995*, where social protection schemes include interventions to relieve individuals of the burden of the following risks: Sickness and health care, disability, old age, death of spouse or family provider, family and children, unemployment, housing and other social exclusion. Private voluntary social protection schemes are not included here. In this article we study the total revenue collected to finance the social protection mentioned. In table 1, we divide total receipts into the following four categories:

Table 1. Main financing shares of total receipts according to EUROSTAT definitions.

<table>
<thead>
<tr>
<th>Main financing shares</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Public financing.</td>
<td>This includes general government (central state, regional or local governments) contributions to cover the costs of running public non-contributory schemes and financial support by general government to other resident social protection schemes.</td>
</tr>
<tr>
<td>2. Employers contributions.</td>
<td>The costs incurred by employers on behalf of their employees.</td>
</tr>
<tr>
<td>3. Contributions paid by insured persons</td>
<td>The costs incurred by protected persons to secure entitlement to social benefits.</td>
</tr>
<tr>
<td>4. Other financing</td>
<td>Transfers from other schemes and such sources as interests and dividends.</td>
</tr>
</tbody>
</table>

In the classification of table 1 the contributions of employers and by insured persons are separated. There are arguments from economic theory which speak against this kind of practice, because both
contributions constitute indirect labour costs. We have chosen to proceed in this way, however, because the transparency of the financing mechanism may have efficiency effects.⁶

**Figure 8.** Social protection financing shares in the euro area 1980-1999. Averages weighted by population shares.

![Figure 8](image)

**Figure 9.** Social protection financing shares in the non euro area (NEA), 1980-1999. Averages weighted by population shares.

![Figure 9](image)

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⁶ For the items of the discussion concerning the incidence of social security contributions, see Hagfors (2000) and Boadway and Wildasin (1984, p. 348-412).
The period of the EUROSTAT observations covers the years 1980-1995. For estimating the effects of the third stage of EMU on the structure of social protection financing we need observations until the year 1999. Therefore we have forecasted the development of the financing shares in the European Union by making country specific forecasts and constructed weighted averages for the whole area. The forecasting method is described in the appendix and the forecasts for the euro area as well as the non-euro area (Denmark, Sweden and the United Kingdom) are presented in the figures 8 and 9 respectively. Although our main interest concerns the development in the euro area, there seems to be some interesting differences between the two figures.

The general feature of figures 8 and 9 is that the average structure of social protection financing has been quite stable during the whole research period. The contributions paid by employers have formed the largest share of total financing in the euro area, over 50 per cent at the beginning of the 1980's. After a downward sloping trend until the middle of the 1990's, the share has stabilised around 45 per cent in the forecasting period. The development of public financing and the contributions paid by insured persons is seen as a mirror image of the development of the employers' shares. After fifteen years of slow increase, the shares have approached each other at a 27 per cent level. The share of public financing seems to be decreasing in the forecasting period, while the share of insured persons is still increasing. The share of other financing has remained modest through the whole period.

In the non-euro area the development has been quite different. The largest financing share is that of public financing, which after the economic crisis at the beginning of the 1990's exceeded 50 per cent of total financing, and stayed there slightly increasing in the forecasting period. The employers' financing share has decreased during the whole period and the contributions paid by insured persons and other financing have remained at a 10 per cent level all the time. An interesting increase in other financing occurred at the end of the 1980's. This increase was compensated by a decrease in the share of public financing.

Finally, though the development of the financing structure seems quite stable at the weighted average level, the country specific changes are significant, and in order to examine the convergence behaviour we have to concentrate on the country specific observations and a classical approach to the convergence analysis.
4. Convergence of the financing structure

We approach the study of convergence empirically. Though there exists a large literature of comparative welfare state studies classified to different generations (see Mäkinen 1999), they mainly compare the socio-economic systems of different countries (such as the European and US socio-economic models, Cichon 1997), or social policy (Rhodes and Schuman 1996, Saari 1999). The economic problems and effects on social policy are often circumvented by studying the effects of unemployment. The results of the studies also seem to be contradictory. (See Mäkinen 1999, p. 6). As important as the effects of unemployment on social policy certainly are, we here concentrate on the convergence of the structure of social protection financing, a much less studied research object. This kind of research has been done earlier by Hagfors (1999a), who studied the convergence of the financing structure in the member countries of the European Union in 1980-1995. In that study a mild convergence was found in the financing structure. Here we take the same kind of approach, which means that we utilise the methods of the empirical research on economic growth.

There are two main empirical findings in the analysis of economic growth. First we have the conventional conclusion that countries with low initial income are growing faster than economies with high initial income. The result would then be treated as evidence of the well-known convergence hypothesis. On the other hand, there are alternative approaches, where the conventional convergence findings mask the presence of convergence clubs and the distribution polarising into twin peaks of rich and poor. (See Quah 1996; 1997.) Here we are applying the conventional approach, which utilises cross-sectional regressions in a classical convergence analysis. (Sala-i-Martin 1996.)

There are two central concepts of convergence in the classical growth literature: Absolute convergence and convergence in deviation. The two concepts are not identical, as it is possible to find absolute convergence without convergence in deviation, so that absolute convergence is a necessary but not sufficient condition for convergence in deviation. (See Hagfors 1999a, Box 1).

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7 Durlauf (1996) provides an introduction to the controversy over the convergence and divergence of growth rates.
8 Absolute convergence means that there exists a common average toward which the countries are moving. For this reason the approach which applies cross-sectional regressions has also been criticised in the economic growth literature. The defenders of classical convergence research have utilized the notion of conditional convergence, according to which countries do not converge towards a common steady state growth path. This debate is connected with the theoretical reappraisal of the neoclassical versus new endogenous growth theory. (For the discussion, see, Barro and Sala-i-Martin 1997; Caselli et al. 1996; Cohen 1996; Durlauf and Johnson 1995; Galor 1996; Jones 1997; Quah 1993; 1996a; 1996b; 1997 and Sala-i-Martin 1996.)
In this article, we estimate the absolute convergence using our cross sectional data on social protection financing shares in 1980–1992 and 1993-1999. Following Sala-i-Martin (1996) we regress linearly the annual growth rate of the financing share with the initial level of the share at the beginning of the period. If the slope coefficient ($\beta$) is negative, we say that there exists absolute convergence. In the same way we can estimate the speed of convergence using a nonlinear model. The regression equations for both cases are presented in the appendix.

If the shares of social protection financing are each converging towards their averages, we can conclude that there exists a uniform financing structure for the euro area countries toward which they are converging. We have proceeded in the following way: first we have, for each of the four financing shares, taken the logarithmic level of the share at the beginning of the period, 1980 or 1993. Then we have calculated the annual growth rate of the share during the periods 1980–1992 and 1993-1999. For each financing share the dependence of the growth rate on the initial share value was estimated using the two regression models. The results are presented in table 2.

Table 2. **OLS and NLS regressions in 1980-1992 and 1993-1999. Slope coefficients of equation (1) and values of parameter $\beta$ of equation (2) in the appendix.** (Standard error in parenthesis).

<table>
<thead>
<tr>
<th></th>
<th>Absolute convergence</th>
<th>Speed of convergence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>-0.0214</td>
<td>0.0297</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Employers</td>
<td>0.0073</td>
<td>0.0160</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>Insured</td>
<td>-0.0136</td>
<td>-0.0754</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Other</td>
<td>-0.0130</td>
<td>0.0173</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.018)</td>
</tr>
</tbody>
</table>

The parameter estimates in table 2 indicate that the public financing share was converging in the period 1980-1992 by approximately 2 per cent annually. In the second period the direction changed toward divergence, which proceeded by 2.4 per cent annually. The employer contributions diverged
less than 1 per cent in the previous period, and the divergence increased to 1.9 per cent annually in the second period. The most dramatic change occurred in the financing share of the insured persons’ contributions, where, after a 1 per cent convergence in the previous period, the convergence speeded up to 9 per cent annually in the second period. The convergence of the share of other was slow, and actually turned to a 2 per cent annual divergence in the second period. In this case, the results of the speed of convergence equations were contradictory.

In figures 10 and 11, both with two panels, the four panels represent the shares of public financing, employers' contributions, contributions by insured persons, and share of other financing. In the scatter diagrams the initial share level is on the horizontal axis and the annual rate of growth on the vertical axis. A regression line has been drawn for each financing share in both periods. For convergence to exist, the regression line must be sloping downwards. This is the case of the first period in panel 1 of figure 10. It looks like there has been absolute convergence in the public sector financing share from the beginning of the 1980's to 1992. In the next period the regression line has turned upwards, which means, that there existed divergence in that period.

We can extend this analysis to the share of employers' contributions in the second panel of figure 10. In both periods the lines are sloping upwards, which means that the shares of employers’ contributions were diverging in both periods in the euro area, slightly more in the second period. The share of contributions by insured persons in panel 1 of figure 11 is converging in the first period. In the second period the line shows a steep downward slope. A strong effect of Sweden on the position of the regression line can be noticed. Finally, in panel 2 of figure 11, where the shares of other sources of financing are presented, the angle of the lines provides some basis for the conclusion that there has been a moderate convergence during the period 1980–1992, but in the second period the development has been of a diverging nature, because the line is now sloping upwards.
Figure 10. Absolute convergence in public financing (panel 1) and employers’ contributions (panel 2), 1980-1992 and 1993-1999.

Panel 1.

Panel 2.
Figure 11. Absolute convergence in contributions by insured persons (panel 1) and other financing (panel 2), 1980-1992 and 1993-1999.

Panel 1.
5. Conclusions

The changes in the area of social policy are usually relatively slow. In this article we have studied one of the most important parts of social protection, financing. We have especially concentrated on the question, whether the structures of social protection financing have converged or diverged while the euro area countries have adjusted their economic environments to the third stage of EMU. Can similar features be traced in the development paths of economic performance and financing structure during this period?

We were using some key economic indicators for studying the economic performance in the euro area. Having analysed the dispersion of those indicators, we were able to conclude that there was convergence in the economic growth and unemployment rates in the research period. This was also the case with the inflation rate, though in the last few years there seems to have been some divergence. The convergence result was confirmed by the use of a pentagon of the relative changes. It was found that the relative changes of the tax rates, debt rates, interest rates, unemployment and the openness of the euro area economies before the year 1993 showed a diverging behaviour. In the period after 1993, the development was of a converging nature.

A classical convergence analysis was performed to the structure of social protection financing. It was found that, in the period 1980-1992, the main financing shares showed convergence with a relatively small variation. In the period after 1993, there seems to have been structural changes which have lead towards a diverging behaviour, and we conclude, that when the economic environment was diverging, the structure of social protection financing was converging. When the economies started to converge, the financing structure started to diverge.

The results of this article are, of course, conditional on several assumptions which were necessary for carrying the research through, and the inverse relationship may not hold good for different time periods or more sophisticated data and methods. But it may well hold good. And if so, the forecasts made for the first few years of the present century (see Kotilainen 2000), which imply a convergence in the growth rates, unemployment rates and price stability, also imply country specific social policies and differing financing structures in the euro area..
Bibliography


Technical annex

A. Convergence Equations

Absolute (β) convergence

The convergence has been estimated by applying the following loglinear equation (1) using the Ordinary Least Squares method:

\[
(1) \quad \frac{1}{T} \ln \left( \frac{Y_T}{Y_0} \right) = \alpha + \beta \ln Y_0 + \varepsilon_T, \quad \text{where}
\]

where \( T \) is the number of time periods, \( Y_0 \) is the initial value and \( Y_T \) is the terminal value.

The condition for convergence is that the convergence coefficient \( \alpha < 0 \).

The speed of convergence

The Nonlinear Least Squares method was used in the estimation of the following type of equations:

\[
(2) \quad \frac{1}{T} \ln \left( \frac{Y_T}{Y_0} \right) = \alpha - \left[ \frac{(1 - e^{(-\beta T)})}{T} \right] \ln Y_0 + \varepsilon_T.
\]

Here the speed of convergence grows with the parameter \( \alpha \).

B. Forecasts

The forecasts of the financing shares in different countries for the years 1996-1999 were made using the following steps:

1. **The identification of the model.**
   Autocorrelation and partial autocorrelation functions were studied in order to specify the form of autocorrelation. If in three of four cases the form of autocorrelation was identified to be similar, that form was selected, because the fourth share was determined as a residual. The general form identified was AR(1) process.

2. **The predictor variables.**
   The following variables were chosen as predictors in forecasts for the years 1996-1999: Gross tax rate, gross debt, logarithmic GDP, openness as a relation of imports and exports to GDP, and unemployment rate. Data come from OECD Economic Outlook, June 1998, where the years 1998 and 1999 are forecasted by OECD.

3. **Estimation**
   The equations were estimated iteratively by using the exact maximum-likelihood method.
Appendix Figure 1. The share of public sector financing in the euro area in 1980-1999.
Appendix Figure 2. The share of employers’ contributions in the euro area in 1980-1999.
Appendix Figure 3. The share of contributions paid by insured persons in the euro area in 1980-1999.
Appendix Figure 4. The share of other financing in the euro area in 1980-1999.