Inequality, integration, and policy: issues and evidence from EMU

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Abstract

Economic integration fosters production efficiency by enhancing market competition, and makes it difficult for National governments to conduct independent fiscal policies and to enforce income redistribution schemes. Controlling for country-level income variation, available data suggest that Europe's Economic and Monetary Union (EMU) was associated with a small but significant increase in disposable income inequality, reflecting less generous social policies.

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1.Introduction

Much has been written about the macroeconomic, trade, and productivity implications of economic and monetary integration.[1] An extensive if somewhat inconclusive body of theoretical and empirical work has dealt with interactions between economic integration and income inequality within and across countries.[2] But as the early stages of the European process of economic integration focused on deregulation and production efficiency, little attention has been paid by researchers to inequality issues in the context of the European economic and monetary union experience. Policies that redistribute income so as to reduce its cross-sectional inequality and variability over time are pervasive in Europe, and are implemented at the National level within the European Union. In the cyclical downturn of the early 2000s, it was common for public opinion and National politicians to blame feelings of economic insecurity on the most novel and most apparently avoidable aspect of recent experience: the euro and, more generally, deeper and wider economic integration in the European Union (EU). [3] Assessing the theoretical and empirical basis for such concerns is arguably all the more important as Europe and the world enter a new phase of recession and nationalization of economic activity.

This paper analyzes the implications for growth and income inequality of Stage Three of the European economic and monetary integration process, i.e. adoption of the euro as the single currency (EMU, for brevity, in what follows). Section 2 outlines how EMU may be related to inequality through macroeconomic channels and, especially, because of its implications for market and policy reactions to tight and irrevocable integration of goods and financial markets. Section 3 assesses the empirical association between EMU, economic performance, inequality, and social policy. Section 4 concludes summarizing and outlining policy implications.

2.Income distribution, market integration, and policy

Economic and monetary union can influence income distribution through at least three channels: macroeconomic policy constraints, market integration, and redistribution policy reforms.

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[1] See for example the papers in Baldwin, Bertola, Seabright (2003) and their references to other studies of the impact of EMU on a variety of structural features and economic outcomes, notably the intensity of trade.

[2] See, e.g., Spilimbergo, Londoño, and Székely (1999).

[3] Eurobarometer (see http://europa.eu.int/comm/public_opinion/flash/fl171_en.pdf) found that top reasons for a 'no' vote to the European Constitution referendum by French citizens included *'loss of jobs'* (31%), *'too much unemployment'* (26%), *'economically too liberal'* (19%) and *'not enough social Europe'* (16%). Opposition to the first draft of the Services directive was similarly rooted in the fear that supply of cheap, unregulated labor in Continental European countries would endanger their social welfare models.

2.1 Macroeconomic policy and inequality

In a single-currency area, countries cannot conduct independent monetary policies, and (intra-area) exchange rates cease to affect their competitiveness vis-à-vis each other. To the extent that the Growth and Stability pact is a binding constraint, fiscal policy instruments are also less than fully available under EMU. As discussed in more detail by Sapir et al. (2004), constraining macroeconomic policies can make it difficult to stabilise economic activity when savings and investment decisions are imperfectly coordinated, and prices and wages are inflexible. The same fiscal and monetary instruments that can be useful in that context, however, can also generate and propagate aggregate shocks if used in pursuit of objectives different from macroeconomic stability, and can precipitate crises if implemented in unsustainable ways. Monetary union has undoubtedly allowed member countries to achieve stability, granting previously elusive credibility to some countries, and preventing spill-overs from trading partners' unstable policies. And macroeconomic stability can foster growth, in that long-horizon investment and innovation decisions are easier and better informed in a more predictable environment.

Inequality can be affected by these macroeconomic aspects, in that country-level fluctuations influence incomes differently across different individuals. Wage and unemployment developments are very important determinants of personal income inequality, and if nominal prices and wages are rigid foregoing devaluations may require sharper activity slowdowns, unemployment increases, and consumption wage reductions when it is necessary to restore competitiveness. Credibly ruling out devaluation options, however, may enforce wage moderation at any given level of unemployment, and reduce the degree of real wage rigidity implied in conditions of poor monetary policy credibility by anticipation on the part of wage-setters of future devaluations. In an integrated economic area, however, cyclical influences span national borders, and National macroeconomic policies are a blunt tool against fluctuations. When most labour market shocks occur at the regional or industry level, the fiscal policy independence suppressed by EMU would likely be a source rather than a remedy for national economic fluctuations (Darvas, Rose, and Szapáry, 2005). And as macroeconomic stability and tight market integration calls for wage an employment flexibility in response to sector- and regions-level shocks, the coordinated wage bargains that proved useful in order to cope with country-specify adjustments to shocks may hinder the necessary adjustments, as centralization tends to compress wages.

2.2 Integration, distribution, and risk

From this market-oriented perspective, EMU does not only deprive its member countries of macroeconomic policy independence: it also opens the way to new market forces and new sources of shocks, as a single currency is also an extremely important step towards full integration of microeconomic market interactions. The absence of currency risk improves price transparency, reduces the extent to which price and wage stickiness may blur relative productivity signals, and supports economies of scale in deeper markets for goods, services, and financial products. Wider and deeper market integration fosters efficiency both through such direct channels, and also by exerting pressure towards efficiency-enhancing reforms, which may also be spurred by the absence of devaluation and other macroeconomic escape routes towards at least temporarily better competitiveness (Belke, Herz, and Vogel, 2007, review the relevant theoretical channels and evidence).

The implications of market integration for income inequality are ambiguous. Like any change, economic integration affects not only the aggregate amount but also the distribution of income and welfare. Diversion of trade from within to across countries' borders can benefit some producers and damage others. Most intuitively, integration with poorer countries may increase inequality in rich countries, as their poor citizens' incomes are bid down by competition from substitutable workers in poor countries. More generally, however, factors of production can be complementary rather than substitutable across borders.[4] And factors can move or accumulate over time, in ways that influence patterns of production and income across countries and individuals interacting in integrated markets. If income is higher and returns to investment lower where more capital is available, integration should reduce inequality as production grows faster where it is initially low; but if production exploits increasing returns instead, market integration can increase income inequality.[5]

The interplay between these channels implies that the inequality impact of integration is theoretically ambiguous overall, and amenable to empirical investigation. In practice, inequality in most advanced countries has been increasing since the 1970s, bringing to an end a long decline in the earlier part of the 20th century (see Atkinson and Piketty, 2007, for evidence on top incomes, and Atkinson, 2008, for evidence on earnings inequality). This pattern broadly parallels that of global economic integration indicators, but it is difficult to identify the effects of economic integration separately from those of technological change. On the one hand, because the extent of economic integration is shaped by

[4] See O'Rourke (2001) for an overview of mechanisms and evidence.

[5] Bertola, Foellmi, and Zweimueller (2006) discuss extensively the relevant interaction channels.

progress in transportation and communication technologies, as well as by trade liberalization and other policy trends. On the other hand, because the two phenomena have similar effects on the distribution of incomes in advanced countries. A portion of the observed increase in income inequality is accounted for by widening pay differentials across education levels, and may be explained by mechanisms whereby unskilled workers are substituted (and skilled workers complemented) by machines and/or by less developed countries' labour.

A particularly welfare-relevant portion of income inequality, however, may reflect ex post random events rather than ex ante, permanent factors. The volatility of each worker's income over his or her lifetime may also be related to economic integration: as more widely integrated markets react more promptly and more sharply to differences in prices, small cost shocks can have dramatic effects on production. Survey evidence indicates that perceived labour market risk is higher for workers working in more internationalized sectors (Scheve and Slaughter, 2004), and that, even though integration is expected to be beneficial on average, the average individual is against immigration and trade in most countries. Higher aggregate production levels are not unambiguously beneficial when markets (especially financial markets) are imperfect and incomplete, making it impossible to assess welfare on a "representative individual" basis. As integration changes the distribution of income and of consumption across heterogeneous agents, attitudes towards it depend on whether individual agents expect to find themselves above or below the average of income changes. In surveys, opposition to economic integration is indeed sensibly stronger on the part of individuals who are theoretically more likely to be damaged by it, such as low-skilled workers in countries that receive low-skilled migration inflows (see Mayda, O'Rourke, and Sinnott, 2007).

Studies of such channels of interactions have mostly focused on economic integration between countries at vastly different levels of development, as in the case of North/South globalization patterns or of the EU's enlargement to transition countries. Economic integration among countries with similar endowments, such as the original six members of what is now the European Union and the current Eurozone members, has often been supposed to yield mostly economies of scale and of variety, with little (if any) implications for within-country income distribution. Different aspects coexist in all economic integration experiences, however, and there is no reason to expect any income-volatility implications of economic integration to be less pronounced in the case of Eurozone countries than in that of more diverse, but less tightly integrated economies.

2.3 Redistribution policy

Europe's pervasive Welfare State tradition makes it particularly interesting to consider interactions between integration of the markets where individual agents' decisions take place, and implementation of collective policies. Labour incomes are affected not only by macroeconomic and international market developments, but also by such features as the influence of unions in wage setting, unemployment insurance schemes, and employment protection legislation. When unemployment is induced by compression of wage differentials and subsidized then, as discussed in Checchi and García Peñalosa (2008), it is not a source of risk but a relatively permanent feature of individuals' labour market position, and it is correlated with more equal disposable incomes at the household level . Bertola (2008) analyzes the relationship between labor market policy and outcomes and EMU inception, using methods similar to those of this paper and finding that inequality developments are largely accounted for by changes in unemployment and employment.

Other collective policies are also crucially relevant to income distribution. People do not only interact through markets. Reducing *ex ante* inequality can be desirable in order to foster social cohesion, and redistribution policies can offset *ex post* income shocks when information and implementation problems prevent insurance markets from smoothing out their welfare impact. If imperfect and incomplete information does not make it possible to distinguish random events from the effects of individual efforts, however, then redistribution decreases production efficiency at the same time as it reduces the role of luck in the determination of individual welfare.

Thus social policy, like all policies, has desirable and undesirable effects, whose relative strength depends on the economy's characteristics. The impact of economic integration on its implementation is twofold. On the one hand, new cross-border sources of risk may increase the appeal of policies meant to buffer the welfare implications of uninsurable risk, and may explain why more open countries' governments are more deeply involved in economic matters. On the other hand, international economic integration also affects the viability of National redistribution policies. Wider, less constrained market interactions improve efficiency because they offer more choices to individual economic agents. But they also make it more difficult for policies to shape individual choices differently from what would be implied by unavoidably imperfect market mechanisms. Depending on whether demand or supply influences dominate, integration may in practice increase or decrease the intensity of collective redistribution and other interferences with *laissez faire* markets at the country level (Agell, 2002). Survey evidence indicates that attitudes towards economic integration are also shaped by their impact on redistribution policies (Mayda, O'Rourke, and Sinnott, 2007). Hence,

economic integration's political sustainability may well require coordination of social policies at the same level as that of market interactions (Bertola, 2006).

3.Income distribution and EMU

The previous section's review of theoretical insights suggests that the impact of integration on inequality is ambiguous overall, but plays out through well-defined and policy-relevant channels of interaction. Identifying such channels and assessing overall inequality effects is an essentially empirical problem.

3.1 Data

For a useful set of countries and periods, Eurostat publishes measures of household equivalised disposable income inequality. Despite comparability and measurement problems (discussed below), no other data source appears comprehensive enough for this paper's purposes.

Two inequality indicators are available: the "quintile ratio" (i.e. the ratio of income earned by the top fifth of the population ranked by increasing income, to that earned by the bottom fifth); and the Gini coefficient, which is influenced by the overall shape of the income distribution and gives more weight to its middle portion. Both are increasing in the extent of inequality: the quintile ratio ranges upwards from unity as less income accrues to the bottom fifth of the households and more to the top fifth; the Gini coefficient ranges from zero to 100 as the underlying distribution goes from perfect equality to complete concentration.

As shown in Figure 1, EU-level inequality indicators follow a U-shaped path around adoption of the euro. Inequality, according to both measures, was declining or constant until 2000, remained flat through 2001, and increased back to 1996 levels by 2002.[6] Later data are based on different methods, and offer a mixed picture of inequality developments until the end of the sample (the latest indicators displayed are those computed on the basis of data collected in 2006, and refer to 2005 incomes).

The U-shaped path of inequality in Figure 1 makes a forceful case for exploring the relationship between EMU and inequality but, of course, many factors other than EMU drive inequality in the

[6] The Eurostat convention is to attribute inequality data to the survey year, whatever the underlying income reference period: typically, "for the income reference year preceding the date of the survey" (see http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/ilc_sm1.htm). Thus, the labels the figures (and the timing of covariates in the regressions below) refer to the year before the one attached to the data on the Eurostat website. In the working paper version of this project (Bertola, 2008) dating of inequality indicators was not adjusted. The results, while broadly similar, were of course different in many respects.

observation period. And inequality is not necessarily interesting *per se*: research has to assess its relationship to dimensions of economic performance and policy that may also be affected by EMU, and this will motivate attention to income and social policy in what follows.

Another reason the dynamics of inequality indicator may motivate but not satisfy curiosity as regards their relationship to EMU is that Eurostat measurement methods for inequality have changed, in terms of both definitions and underlying data, at roughly at the same time as EMU. Between 1995 and 2001, indicators were computed by Eurostat using the European Community Household Panel (ECHP) survey data. As the ECHP was then discontinued, from 2003 Eurostat gradually adopted the Community Statistics on Income and Living Conditions (EU-SILC) methodology. Income inequality indicators still refer to disposable household income, the definition of which is broadly similar with a few exceptions.[7]

Available country-specific observations are plotted in Figure 2, with different symbols depending on the methodology, fur survey incomes between 1995 and 2005.[8] The change in measurement procedure occurs at different times in different countries, and typically implies a missing observation. Dynamics across the methodological change are similar to those observed in other periods. In several cases, they follow a U-shaped path around the turn of the millennium, and are clearly dwarfed by country differences in inequality levels. This makes it essential to try and control for country-specific factors when assessing dynamic developments which, while apparently small, are potentially very important, for two reasons. First, because the aggregate efficiency effects of integration may also appear small: the Single Market Program was estimated in Cecchini (1988) to increase European GDP by a few percentage points, in the 2-6% range. Second, because they can be a reflection of more dramatic changes in individual circumstance. To the extent that higher inequality across individuals results from more pronounced instability over time of individual incomes, the associated increase in uninsurable consumption volatility may well be such as to more than compensate higher levels and

[7] Income as defined in EU-SILC includes in-kind income from work payments made to other households and interest payments on loans; it also aims at including imputed rent from owner-occupation, but this feature is only implemented mandatorily from 2007. Statistics for 2007 are labeled 'provisional' in the Eurostat database at the time of writing this paper, and are not used. I am grateful to Carmen Raluca Ipate, Erich Ruscher, and Andrea Brandolini for help in locating and assessing information on the definition and measurement aspects discussed at length in Eurostat (2005).

[8] Luxembourg observations are excluded: inequality indicators are very similar in Luxembourg, Belgium, and the Netherlands, but Luxembourg's much higher per capita GDP and peculiar financial specialization may spuriously affect the regressions.

faster growth of consumption and income (see Krebs, Krishna, and Maloney, 2005, for a model and some relevant evidence).

3.2 Patterns

A portion of the impressive swing in Figure 1 may be accounted for by composition effects, i.e., by high-inequality countries growing in importance within the aggregate at times of increasing inequality and vice versa. The available data are too scarce to ascertain whether any such composition effects may be structural. Another reason why overall EU inequality may increase is divergence of average income levels across countries. Figure 3 illustrates convergence patterns of country-level average incomes before and after 2000 (weighting by population makes no difference to the results). The data clearly indicate that growth has slowed down rather uniformly after 2000 in the EU15, and that income convergence has all but stopped across member countries. Slower and/or more variable growth in the cyclical slowdown phase may or may not be affected by EMU, as both fiscal and monetary policy were already blunt in the after-Maastricht run-up to EMU when individual countries faced stringent exchange rate and budget constraints. Different convergence rates across EU15 countries may have played a role in determining the dynamics of EU-level inequality in Figure 1, and it will be important in what follows to account for aggregate dynamics when characterizing the association between EMU membership and within-country inequality.[9]

To set the stage for empirical assessment of the joint dynamics of EMU, economic performance, and country-specific inequality developments, it is useful to characterize the variation across countries and over time of variables that are theoretically relevant to inequality. Figure 4 shows that inequality is negatively related to per capita income, which is positively associated with public social expenditure as a fraction of GDP, which is in turn negatively related to inequality. The measure of public social expenditure excludes old-age and survivor benefits which, depending on pension systems, need not be as strongly inequality-reducing as unemployment benefits and other transfers (the sign of partial associations between these variables are the same as those of bi-variate relationships in the regressions in Table 4 below). It is of course unsurprising to find that generous social spending reduces disposable income inequality. The negative relationship between income and inequality, and the positive relationship between income and social spending, arguably reflect underlying structural factors. Taxes and subsidies may in principle perform efficiency-enhancing roles that are beyond

[9] Countercyclical variation in wage inequality and volatility has been documented by many authors, including Storesletten, Telmer and Yaron (2004), mainly on American data. The regressions below assess inequality developments controlling for income.

reach of imperfectly and incompletely informed markets, but governments' attempts to do so encounter the same information and incentive problems as private market participants. Thus, social policy improves equality at the expense of efficiency and aggregate production. As countries differ not only in terms of the political appeal of movements along such trade-off but also in terms of their ability to produce aggregate income, countries that are better able to produce and redistribute income will find it easier to bear the efficiency costs of more extensive redistribution. To the extent that relationships between the variables of interest are jointly caused by structural and cyclical exogenous variation, inclusion of per capita income in the regressions below may help control for factors that are structurally related to inequality and inequality prevention, and not directly affected by economic integration.

Data computed on the basis of different methodologies are plotted with different symbols in Figure 4. Definitional changes appear to be associated with a mild and parallel shift in the relationship of indicators to per capita income. While the relevant patterns are very similar for both inequality indicators (the sample correlation of Gini coefficients and income quintile ratios exceeds 0.95), the choice of income indicator has interesting implications. When per capita income is measured in terms of real 1995 euro GDP, its association with both inequality and social spending is tighter than when using GDP per capita in purchasing power standard, which may a priori be a better gauge of countries' level of development.

3.3 Regressions

To help assess the quantitative relevance of the coefficients in the regressions below, Table 1 displays summary statistics for the relevant variables in the available sample of 11 yearly observations in 14 countries. The time interval covered by the data set is conveniently symmetric around adoption of the euro, and span a cyclical episode: including GDP in the regressions will control for cyclical influences on inequality and social spending, but lack of comparable data for earlier cycles makes it impossible to assess whether the relationship between inequality and macroeconomic conditions has been affected by EMU.

To assess the relationship between the various phenomena of interest and EMU, the following tables report regressions on a dummy variable equal to unity in 1999 and later years for Austria, Belgium, Germany, Spain, Finland, France, Ireland, Italy, Netherlands, Portugal, and in 2001 and later years for Greece. The coefficient of the EMU dummy will capture variation associated, for a given country and in comparison to countries that remain out, with adoption of the common currency. Anticipation and

lagged effects are important in reality, of course, but one-year changes in the dating of the EMU=1 observations make very little difference to the results.

Table 2 displays simple regressions of per capita income and inequality indicators on the EMU dummy. In the top panel, no controls are included, so that the coefficient of EMU is the simple difference between the sample mean of the Eurozone countries and periods, and other observations. This approach gives little evidence of an association between EMU and inequality, some indication that adoption of the common currency was associated with more intense trade in goods (consistently with a large body of recent literature), and with some services and investment integration as well. The EMU dummy is positively associated with per capita income, particularly so for the PPS measure, but this is not particularly surprisingly since euro adoption occurs in the latter portion of the sample. In fact, these simple differences cannot disentangle the effects of EMU from those of aggregate growth and other synchronous developments. Since most of the countries in the sample ended up adopting the euro during the period considered, the association with EMU needs to be disentangled from that with the time of observation, and that with permanent characteristics of the countries considered (other than those associated with their inclination to join EMU). To this end one may include year effects to control for common developments, and country dummies to control for invariant characteristics. The second and third panel of Table 2, however, show that doing so leads to insignificant, imprecise, and conflicting results as regards all variables, including market integration indicators.

The coincidence of EMU developments with enlargement and global cycles, the uncertain timing of EMU, and the very limited number of observation make it difficult to rely on mechanical statistical methods. But the issues are sufficiently important to warrant investigation. Many relevant characteristics may vary across countries and time in ways that are not captured by the same simple dummies that in the bottom panel of Table 2 absorb essentially all of the variation across EMU and non-EMU subsamples. To assess co-variation between inequality and EMU, regressions below will include GDP per capita indicators to control for factors that vary across countries and over time in ways that need not be captured by year and country dummies but, in light of the patterns displayed in Figure 4, are crucially relevant to inequality and social policy.

In all regressions below the presence of GDP in the specification and of countries that did not adopt the euro in the sample controls, to the limited extent possible, for the relationship of inequality to the global cycle, to EU enlargement, and to other events occurring at roughly the same time as EMU. Some of the variation that remains after controlling for such factors may be related to EMU inception.

In the regressions, a dummy variable EMU0 is equal to unity throughout the available sample for all the countries that have adopted the single currency as of 2005, and equal to zero for the other EU15 countries. Its coefficient assesses the relationship between the left-hand sided variable and characteristics (other than those represented by income and any other covariates) that are permanently common to countries that eventually join EMU within the sample.

The coefficient of the EMU dummy then captures the association between monetary union and inequality that is not explained by such permanent characteristics, and by country-specific variation in other control variables included in the regression. It still may be influenced by events occurring over the period it identifies only to the extent that such events affect Eurozone countries differently from Denmark, Sweden, and the UK. While this comparison group is of course far from ideal, the results are not importantly affected by exclusion of any one of these three countries or inclusion of the few EFTA countries for which reasonably complete data are available.[10] The results also appear robust to exclusion of individual countries from the EMU group.

The regressions of Table 3 relate inequality indicators to measures of per capita income, in order to control for structural differences across countries and periods when assessing the relationship between and inequality.[11] The regressions are also run with two alternative income controls, in real own currency terms and in purchasing power standard units. Which one is to be preferred depends on whether the larger inequality variation left unexplained by PPS indicators is viewed as spurious, or instead worthy of investigation and possibly related to economic integration.

In columns (1), (2), (5), and (6) of the Table's two panels, the regressions are run on all data (interpolating missing inequality information, and disregarding definitional changes). Regardless of whether inequality is measured in terms of income quintile ratios or Gini coefficients, and of whether real income per capita is measured in country-specific or PPS terms, the EMU dummy is always positive and significant in these regressions. The coefficient of real income is very significantly negative, consistently with the strong relationship shown in Figure 4 above: the point estimate is the

[10] Data for Norway (available from 1997) and for Iceland (only available in 2004-05) make a small difference to the results when included in the regressions below as part of the non-EMU control group. Inequality data are not available for Switzerland. Data for EU27 countries other than the EU15 and for Turkey offer interesting additional insights into the relationship between inequality, income, and social spending. But new member states' data only begin to be available in 2000, and as of 2005 do not as yet include any Eurozone member. Hence, they are not useful for this paper's purpose of assessing empirical patterns before and after EMU.

[11] Population may be included as a rough control for the likely higher heterogeneity of larger countries, and unemployment may also belong in the regression in light of its possibly structural relationship to inequality across countries and its variation across EMU inception, analyzed in Bertola (2008). When included, unemployment is significant, population is insignificant, and neither affects the estimates of interest.

same for the two measures of real income, but is less precisely estimated when the PPS indicator is used. As a result, more is left to be explained by the EMU dummy, which attracts a larger and more significant coefficient. All results deliver qualitatively similar messages: their reliability depends on which measure of real income is viewed to be more strongly driven by exogenous (to EMU) factors, and more structurally related to inequality. The EMU0 dummy is not significant but increases the statistical significance of the EMU coefficient, indicating that inequality patterns may reflect permanent characteristic of the group of countries that eventually joined EMU as well as actual inception of EMU in those countries.

The other results reported in Table 3 account for the fact that inequality indicators are compiled by different methods in different portions of the sample. Since the main definitional changes occur at specific times, they can to some extent be controlled in statistical specifications by a simple additive dummy equal to one if inequality is measured according to the EU-SILC methodology, to a missing value if data are not published by Eurostat, and to zero otherwise (i.e., if indicators are computed and published on the basis of the ECHP methodology). This need not be an effective way to pool information from different secondary sources (Atkinson and Brandolini, 2001, discuss the relevant issues and highlight their practical relevance). Random measurement errors in the left-hand side variable of a regression, however, would only bias the estimates of interest if the effect of definitional change were systematically different between Eurozone and other countries, and there is little reason *a priori* to suspect this to be true. Since definitional changes certainly affected inequality indicators but presumably did not make them as completely incomparable as additive dummies imply, both these and the previous regressions convey information as to the association between EMU and inequality.

In columns (3), (4), (7), and (8) of Table 3's two panels, the EU-SILC dummy allows inequality indicators to provide completely (if additively) different information before and after the definitional change, and deletes rather than interpolate missing observations. This dummy is significant and substantially reduces the significance of EMU coefficients, which however remain always positive and significantly so in regressions where the Gini coefficient is the dependent variable and real income is controlled in PPS terms. Other changes in the data's information quality are more subtle. For example, it has been pointed out that the ECHP has over time suffered from considerable sample attrition (Lehmann and Wirtz, 2003). To test the robustness of results, Table A1 in the Appendix reports similar regressions run replacing Eurostat indicators for Germany and Italy with Gini coefficients computed from two internally consistent sources, the German Socio-Economic Panel and

the Bank of Italy's Survey of Household Income and Wealth (the two national sources include imputed rent). Controlling for data sources and definitions with additive dummies, the EMU dummy is positive and significant in the resulting data set, especially when PPS real income is used as a control.

The robustly positive coefficient of the EMU dummy indicates that something does differ in the relationship between income and inequality across observations that do and do not come from Eurozone countries and periods. As shown in Figure 4, social policy is strongly and intuitively associated with inequality. It is interesting to assess whether EMU-related changes in the relationship between income and social policy are the channel through which EMU influences inequality, as this would confirm the theoretical insight that ever closer economic integration make it difficult for countries to implement uncoordinated inequality-reducing policies.

Table 4 regresses the share in GDP of public social expenditure (excluding pensions) on EMU dummies and various controls. The first three columns report simple specifications similar to those of Table 2, and the results similarly suggest that mechanical statistical methods would require much more information than is available in the sample: EMU is negatively associated to social policy, more significantly if country dummies are included, but the relationship disappears if both year and country dummies are included. Columns (4-7) document a more structural relationship between inequality and social policy, controlling for the country- and year-specific factors captured by per capita income indicators. The estimated coefficient of the EMU dummy is negative and highly significant in these regressions, indicating that after controlling for per-capita income the share of GDP spent on social policies is lower on average in Eurozone countries after adoption of the euro than in the comparison group. Thus, the data deliver a clear and intriguing message: regardless of whether per capita income is measured in own-currency or PPS real terms, and of whether the identity of countries that eventually join EMU is controlled by the EMU0 dummy, EMU accession is always negatively and significantly related to an indicator of social policy that is negatively related to inequality in the scatter plots of Figure 4.

Since social policy indicators were not included in Table 3, their relation to economic integration (after controlling for per capita income) was absorbed by the coefficients of EMU in those regressions. Table 5 reports results from regressions that relate available inequality indicators to both real income and social policy, and to EMU and measurement dummies. Columns (1) and (5) of the table's two panels document that both quintile ratio and Gini measures of inequality are negatively related to income per capita and to social policy: this completes the picture painted by the bivariate relationships plotted in Figure 4, telling us that in different countries and periods different inequality-

reducing policies may be implemented at the same level of real income, reflecting structural and political features of the relevant environment. The other columns of the Table explore relevance of EMU to the remaining variation, also allowing the EU-SILC dummy to influence both the intercept and the social-policy slope of the regressions. The coefficients of real income and social policy are remarkably stable across these specifications. When not only income but also social policy indicators are allowed to absorb part of the inequality variation associated with EMU's timing, the coefficient of the EMU dummy remains positive, but is only significant when definitional changes are disregarded for the quintile ratio measure of inequality. In the Appendix, Table A2 reports a similar if less significant pattern of results for regressions where Italian and German Gini coefficients are drawn from national sources rather than from the Eurostat database, and definition and source dummies are allowed to influence the intercept and social spending slope of the regressions.

If social policy is controlled for, the direct association between the EMU dummy and Eurostat inequality statistics is small and ambiguous, consistently with the similarly ambiguous implications of theory as regards the inequality impact of economic integration. Unemployment and employment variation also absorb much of the association between EMU and inequality (Bertola, 2008). In regressions not reported, the share of labour income plays a similar (if less significant) alongside social policy expenditure: controlling for GDP per capita, the share in GDP of gross wages and salaries (available from Eurostat for all countries and years in the sample of interest with the exception of Portugal 1999-2005) is significantly lower in EMU than in the non-EMU subsample, and its negative association with inequality is significant for some measures of inequality and income. This may indicate that mobile capital is better able than immobile labour to take advantage of market integration, with personal income distribution effects as financial wealth is more unequally distributed than labour earnings.

4.Concluding comments

The evidence reported and discussed in this paper paints a picture of post-EMU inequality evolution that is intriguingly consistent both with concerns expressed by citizens in Eurobarometer surveys, and with theoretical considerations. Economic integration's inequality effects appear to be mediated by (comparatively, in comparison to pre-EMU and non-EMU status) less generous social policy in countries joining the Eurozone. The association of lower social spending and higher inequality with EMU's macroeconomic policy constraints and market competitiveness concerns is consistent with the

obvious limitation of each country's ability to conduct independent policies in an integrated market environment.

Of course, countries were not forced by an experimenter to join EMU, but chose to do so. The choice was presumably influenced by the relationships detected in the data, which do imply that countries wishing maintain their own social policy standards were well advised not to integrate with others as tightly as EMU implies. Changes in the definition and measurement of inequality at times that broadly coincided with advent of EMU are an additional obstacle in the way of the results' reliability for the purpose of assessing extremely important and topical issues. But even if the data are treated as wholly incomparable before and after changes in definition, the qualitative character (if not the statistical significance) of the results is unchanged. The theoretically ambiguous direct impact of integration on inequality cannot be detected, while the data continue to support the implications of market and budgetary discipline for the feasibility of redistribution policies, and those of redistribution policies for household income inequality.

Like all empirical results, those reported here can be relied upon only to the extent of their statistical significance. But the data that do exist tell an intriguing and theoretically consistent story that has important policy implications. Economic integration may be politically unsustainable if it results in less generous inequality-preventing independent social policies but not foster the higher productivity which deregulation promises when markets work well and, as higher income is associated with lower inequality as well as with more generous social policy, could achieve both the growth and cohesion objectives of European countries.

Data Appendix

All data were downloaded from the Eurostat website in January 2009.

***Sample**:* 1995-2005 annual data for Austria, Belgium, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Italy, Netherlands, Portugal, Sweden (154 observations). See the main text and figures for missing and differently defined inequality indicators. No economic integration indicators are available before 2002 for Belgium. Moreover, the following observations of FDI flows are missing: Denmark in 2004, Greece in 1995-99 and 2002-05, Ireland 1995-1996, and Portugal 2005.

Variable definitions:

Economic integration, Goods: imports plus exports of goods in percent of GDP.

Economic integration, Services: imports plus exports of services in percent of GDP.

Economic integration, FDI: inward plus outward foreign direct investment flows in percent of GDP.

EMU0: dummy, equal to unity for Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Netherlands, Portugal.

EMU: dummy, equal to unity in 1999-2005 for Austria, Belgium, Germany, Spain, Finland, France, Ireland, Italy, Netherlands, Portugal, and in 2001-2005 for Greece.

EU-SILC: dummy, equal to zero for countries and periods where Eurostat makes available the ECHP-based inequality measure, to one for country and periods when the EU-SILC measure is available, and missing (thus eliminating interpolated values and reducing the number of observations) when neither is available.

GDP p.c., euro/ECU: GDP at market prices, euro/ECU thousands per inhabitant at 1995 prices.

GDP p.c., PPS: GDP at market prices, Purchasing Power Standard thousands per inhabitant.

Gini: Gini coefficient of equivalised disposable income.

Public Social Exp.: Social protection expenditure, all ESSPROS classifications except “old age” and “survivor” benefits, in percent of GDP.

Quintile ratio: Income quintile share ratio: The ratio of total income received by the 80% of the population with the highest income (top quintile) to that received by the 20% of the population with the lowest income (lowest quintile). Income must be understood as equivalised disposable income.

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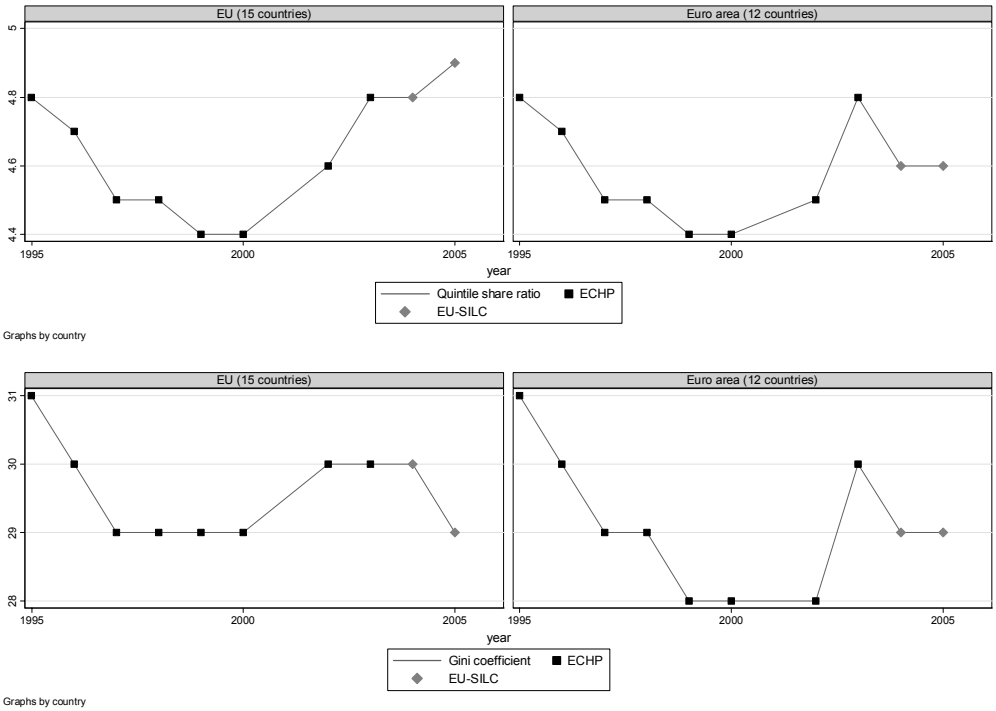
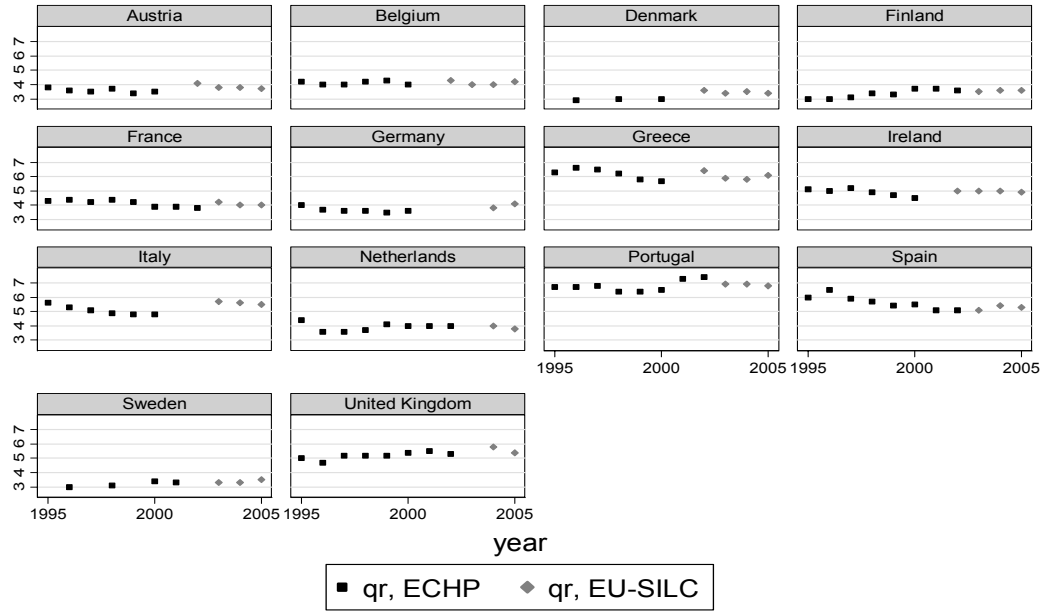


Figure 1 - Evolution of inequality, as measured by the income quintile ratio and Gini coefficients, in the EU15 and Euroarea12 aggregates (2002 is the average of data reported for 2001 and2003; methodology varies).



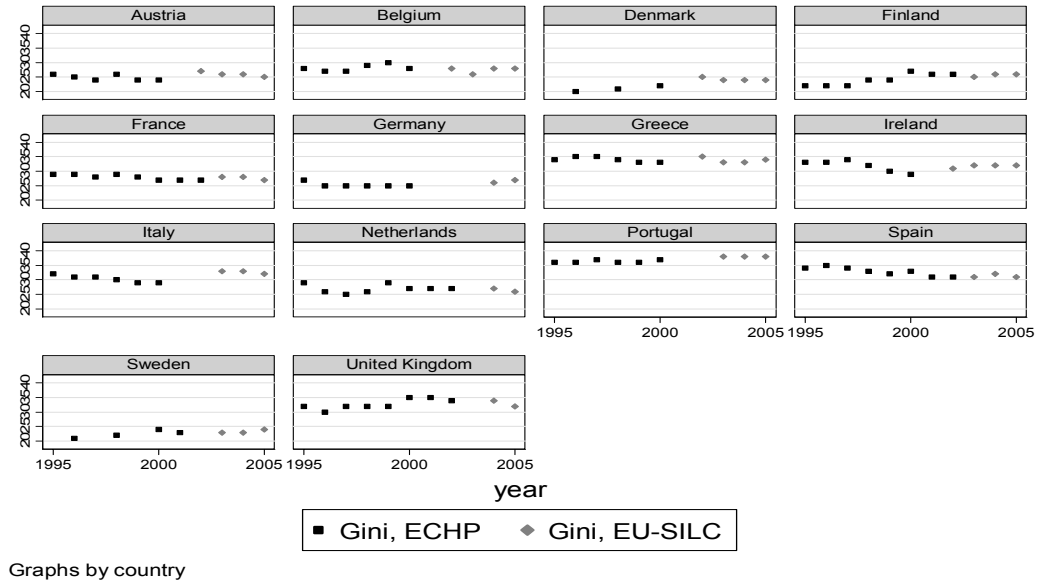


Figure 2 - Income quintile ratios (top panel) and Gini coefficients (bottom panel) EU 15 countries, 1995-2005 (reference years of incomes surveyed).

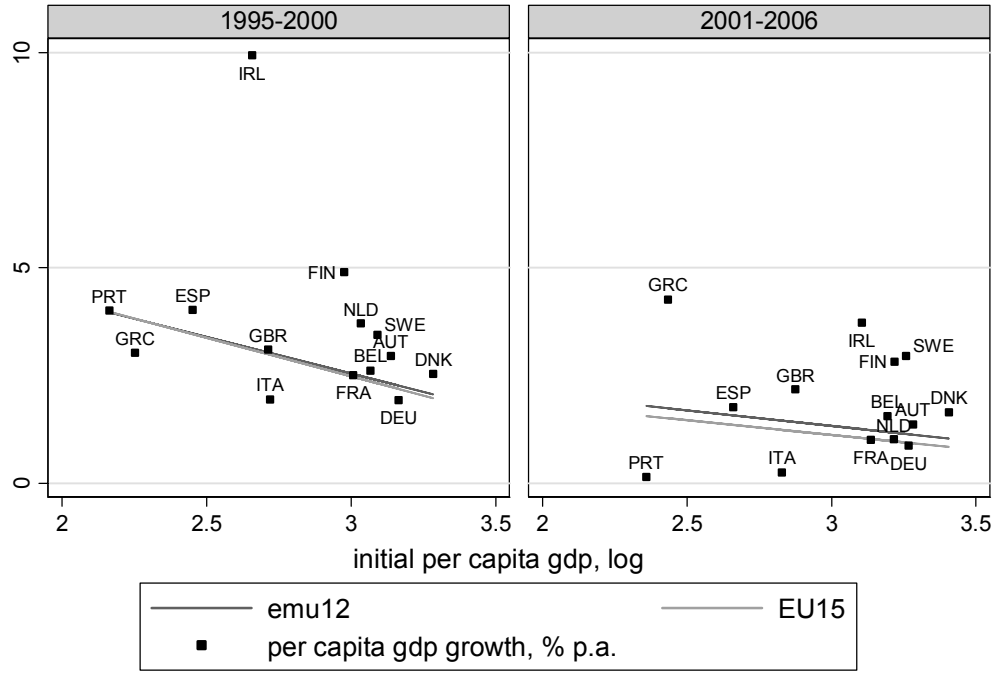


Figure 3 - Relation between initial per capita GDP and subsequent growth across EU15 countries (Luxembourg is excluded); horizontal axis: GDP in constant 1995 euro for the initial year of each sub-period; vertical axis: growth of GDP in constant 1995 euro over the sub-period, annual percentage points. The slope of the regression lines gauges the strength of inequality-decreasing convergence forces.

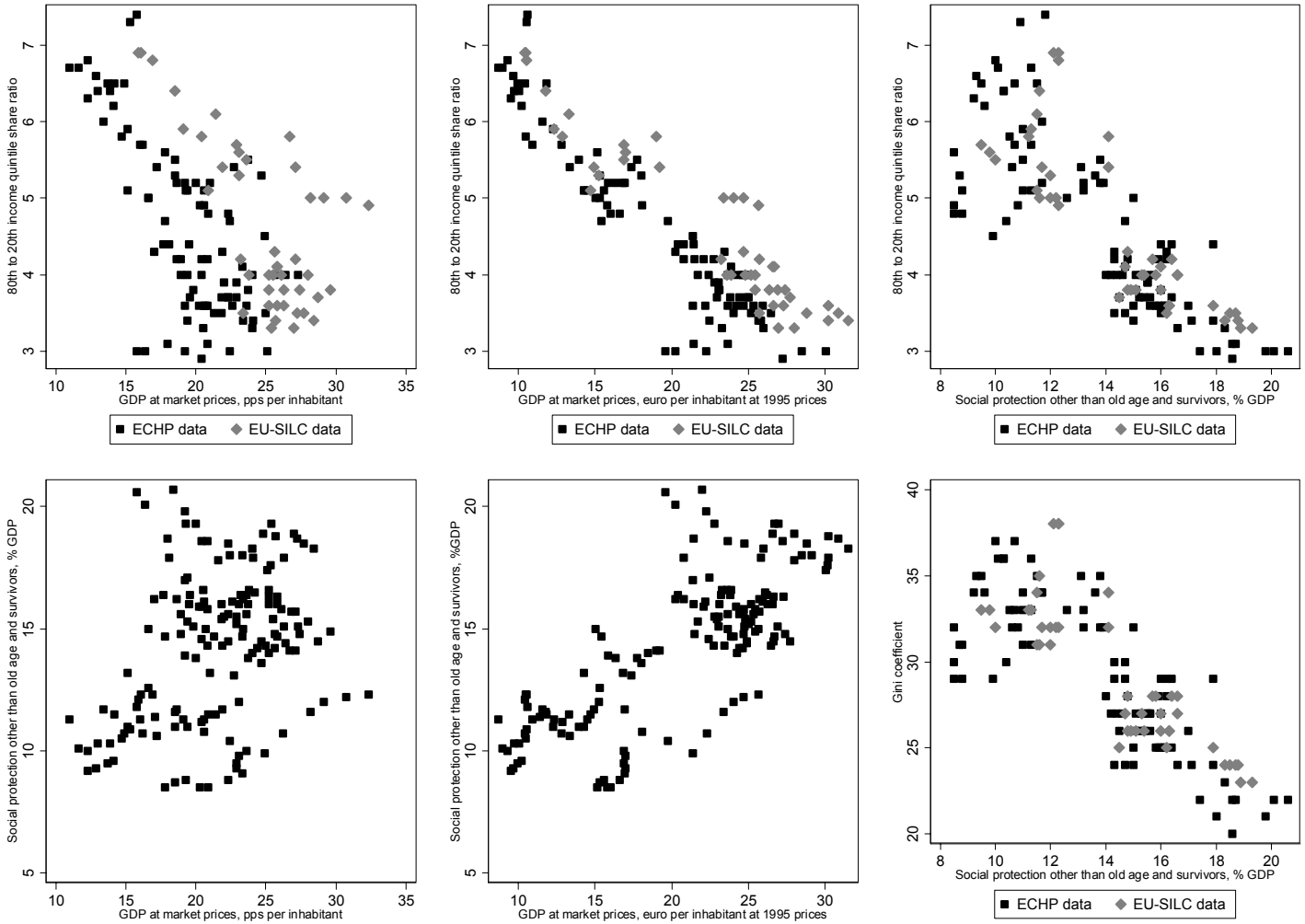


Figure 4 – Scatter plots of per capita GDP at market prices in purchasing power standard units, per capita GDP in constant 1995 euro, income quintile ratio, Gini coefficient, and public social protection expenditure (ESSPROS definition, excluding old-age pensions) as a percentage of GDP; EU15 countries (except Luxembourg), 1995-2005.

Table 1: Summary statistics.

	Mean	Std. Dev.	Min	Max
GDP p.c., euro/ECU	20.6	6.0	8.7	31.5
GDP p.c., PPS	21.4	4.3	11.0	32.3
Public Social Exp.	14.2	3.1	8.5	20.7
Quintile ratio *	4.5	1.12	2.9	7.4
Gini *	28.8	4.6	20.0	38.0

*Missing values of inequality indicators are interpolated for the purpose of computing these statistics

Table 2: Income, inequality, and integration in and out of EMU.

					Economic integration		
	GDP p.c., euro/ECU	GDP p.c., PPS	Quintile ratio *	Gini *	Goods	Services	FDI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EMU	0.73	3.30	0.23	1.09	5.69	2.15	0.94
	0.39	*2.78*	*0.72*	*0.71*	*2.05*	*1.17*	*1.08*
N	154	154	154	154	147	147	134

Regressions also include a constant, robust *t* statistics clustered by country in italics.

					Economic integration		
	GDP p.c., euro/ECU	GDP p.c., PPS	Quintile ratio *	Gini *	Goods	Services	FDI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EMU	-2.97	-1.40	0.45	2.10	6.14	-0.13	-1.06
	-0.85	*-1.16*	*0.67*	*0.67*	*1.23*	*-0.05*	*-0.86*
N	154	154	154	154	147	147	134

Regressions also include year dummies; Robust *t* statistics clustered by country in italics.

					Economic integration		
	GDP p.c., euro/ECU	GDP p.c., PPS	Quintile ratio *	Gini *	Goods	Services	FDI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EMU	-0.03	0.16	-0.29	-2.24	1.19	-0.87	-0.53
	-0.05	*0.28*	*-2.09*	*-3.29*	*0.83*	*-0.50*	*-0.51*
N	154	154	154	154	147	147	134

Regressions also include year and country dummies; Robust *t* statistics clustered by country in italics.

*Missing values of inequality indicators are interpolated for the purpose of computing these statistics.

Table 3: Inequality and EMU.

	Dependent variable: 80th-20th income quintile share ratio							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP p.c., euro/ECU	-0.17	-0.18	-0.18	-0.18				
	-13.20	*-13.56*	*-15.34*	*-14.89*				
GDP p.c., PPS					-0.17	-0.18	-0.22	-0.23
					-3.35	*-3.26*	*-4.74*	*-5.18*
EMU	**0.35**	**0.46**	**0.12**	**0.20**	**0.80**	**0.87**	**0.51**	**0.70**
	2.63	***3.18***	***0.87***	***1.31***	***2.25***	***3.09***	***1.60***	***3.33***
EMU0		-0.24		-0.19		-0.13		-0.38
		-1.00		*-0.96*		*-0.21*		*-0.64*
EU-SILC			0.54	0.51			0.96	0.93
			4.99	*4.86*			*8.87*	*8.64*
N	154	154	135	135	154	154	135	135
r2	0.83	0.83	0.87	0.87	0.38	0.38	0.50	0.51

	Dependent variable: Gini coefficient							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP p.c., euro/ECU	-0.66	-0.66	-0.67	-0.68				
	-17.67	*-11.56*	*-14.51*	*-12.50*				
GDP p.c., PPS					-0.64	-0.60	-0.77	-0.79
					-3.23	*-2.93*	*-4.06*	*-4.43*
EMU	**1.58**	**1.56**	**0.79**	**0.89**	**3.19**	**2.69**	**2.17**	**2.45**
	2.31	***2.39***	***1.27***	***1.47***	***1.90***	***2.33***	***1.49***	***2.94***
EMU0		0.04		-0.23		0.88		-0.56
		0.02		*-0.16*		*0.27*		*-0.18*
EU-SILC			1.61	1.56			2.89	2.86
			2.91	*3.13*			*5.61*	*5.47*
N	154	154	135	135	154	154	135	135
r2	0.76	0.76	0.79	0.79	0.32	0.32	0.40	0.40

Missing values of inequality indicators are interpolated in columns 1,2, 5, 6.
Robust *t* statistics accounting for country clustering in italics below the slope coefficients.
All regressions include a constant.

Table 4: Public social expenditure and EMU

	Dependent variable: Public social expenditure (excluding old age and survivor benefits), %GDP						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP p.c., euro/ECU				0.39	0.36		
				8.18	*7.20*		
GDP p.c., PPS						0.36	0.27
						3.67	*2.79*
EMU	**-1.49**	**-2.90**	**0.16**	**-1.78**	**-1.23**	**-2.68**	**-1.51**
	-1.68	***-1.91***	***0.38***	***-3.32***	***-2.15***	***-3.33***	***-3.10***
EMU0					-1.27		-2.07
					-1.35		*-1.24*
Year dummies		Yes	Yes				
Country dummies			Yes				
N	154	154	154	154	154	154	154
r2	0.06	0.12	0.95	0.65	0.67	0.28	0.32

Robust *t* statistics accounting for country clustering in italics below the slope coefficients.
Regressions without country and year dummies include a constant.

Table 5: Inequality, public social expenditure, and EMU.

	Dependent variable: 80^{th}-20^{th} income quintile share ratio							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP p.c., euro/ECU	-0.12	-0.13	-0.14	-0.14				
	-4.86	*-4.74*	*-6.19*	*-5.28*				
GDP p.c., PPS					-0.07	-0.10	-0.13	-0.15
					-2.84	*-2.55*	*-4.13*	*-4.02*
EMU		**0.30**		**0.10**		**0.45**		**0.28**
		2.12		***0.63***		***1.56***		***1.21***
EMU0		-0.40		-0.30		-0.72		-0.76
		-2.57		*-2.14*		*-2.63*		*-2.99*
Public Social Exp.	-0.13	-0.13	-0.11	-0.12	-0.27	-0.28	-0.25	-0.26
	-2.78	*-2.34*	*-2.28*	*-2.28*	*-7.37*	*-6.29*	*-6.10*	*-6.30*
EU-SILC: Public Social Exp. interaction			0.04	0.03			-0.01	-0.03
			1.12	*0.85*			*-0.43*	*-0.82*
Intercept shift			-0.03	0.03			1.02	1.23
			-0.06	*0.05*			*2.33*	*2.38*
N	154	154	135	135	154	154	135	135
r2	0.86	0.87	0.90	0.90	0.75	0.79	0.82	0.86

	Dependent variable: Gini coefficient							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP p.c., euro/ECU	-0.42	-0.45	-0.48	-0.48				
	-4.02	*-4.07*	*-4.63*	*-4.39*				
GDP p.c., PPS					-0.22	-0.29	-0.38	-0.43
					-2.28	*-1.81*	*-2.89*	*-2.81*
EMU		**0.84**		**0.38**		**0.94**		**0.72**
		1.63		***0.72***		***0.84***		***0.83***
EMU0		-0.71		-0.77		-1.52		-2.12
		-0.50		*-0.59*		*-0.83*		*-1.20*
Public Social Exp.	-0.62	-0.58	-0.55	-0.57	-1.13	-1.16	-1.03	-1.08
	-2.38	*-2.00*	*-2.09*	*-2.01*	*-5.91*	*-4.64*	*-5.09*	*-4.79*
EU-SILC: Public Social Exp. interaction			0.13	0.12			-0.05	-0.10
			0.93	*0.83*			*-0.40*	*-0.65*
Intercept shift			-0.25	-0.28			3.10	3.75
			-0.12	*-0.13*			*1.70*	*1.82*
N	154	154	135	135	154	154	135	135
r2	0.80	0.81	0.83	0.83	0.71	0.72	0.75	0.77

Missing values of inequality indicators are interpolated in columns 1,2, 5, 6.
Robust *t* statistics accounting for country clustering in italics below the slope coefficients.
All regressions include a constant.

Appendix tables

German Gini coefficients from Eurostat are replaced in these tables by 1995-2005 annual estimates kindly provided by Joachim R. Frick, using the German SOEP data maintained at DIW Berlin and the definition documented in Grabka and Frick (2008); the GSOEP dummy variable equals unity for all Germany observations. The Italian Gini coefficients from Eurostat are replaced in these tables by those kindly estimated by Andrea Brandolini on the Bank of Italy, Survey of Household Income and Wealth data set, for 1995, 1998, 2000, 2002, 2004, 2006; the SHIW dummy equals unity for these years' Italy observations, others are set to missing.

Table A1: Inequality and EMU

	Dependent variable: Gini coefficients			
	(1)	(2)	(3)	(4)
GDP p.c., euro/ECU	-0.67	-0.68		
	-13.23	*-11.33*		
GDP p.c., PPS			-0.72	-0.76
			-3.68	*-4.07*
EMU	**1.24**	**1.50**	**2.60**	**2.99**
	1.94	***2.30***	***1.77***	***3.34***
EMU0		-0.61		-0.79
		-0.40		*-0.25*
EU-SILC	1.45	1.35	2.45	2.42
	2.21	*2.24*	*3.99*	*4.04*
GSOEP	2.38	2.48	-0.21	-0.08
	3.79	*3.30*	*-0.20*	*-0.07*
SHIW	2.32	2.34	5.09	5.20
	4.88	*4.92*	*5.22*	*5.05*
N	134	134	134	134
r2	0.78	0.78	0.41	0.41

Robust *t* statistics accounting for country clustering in italics below the slope coefficients.
All regressions include a constant.

Table A2: Inequality, public social expenditure, and EMU

	Dependent variable: Gini coefficients					
	(1)	(2)	(3)	(4)	(5)	(6)
GDP p.c., euro/ECU	-0.38	-0.41	-0.43			
	-4.11	*-4.65*	*-4.78*			
GDP p.c., PPS				-0.23	-0.33	-0.35
				-1.79	*-2.67*	*-2.71*
EMU	**1.03**	**0.66**	**0.49**	**1.04**	**0.93**	**0.71**
	1.82	***1.04***	***0.85***	***1.02***	***1.08***	***0.82***
EMU0	-0.75	-1.32	-1.02	-1.42	-2.24	-1.98
	-0.56	*-1.15*	*-0.85*	*-0.85*	*-1.46*	*-1.22*
Public Social Exp.	-0.78	-0.79	-0.83	-1.29	-1.31	-1.37
	-3.82	*-3.73*	*-3.77*	*-7.10*	*-7.43*	*-7.38*
EU-SILC		1.22	-2.54		1.77	-1.28
		2.36	*-2.64*		*2.79*	*-0.72*
GSOEP		2.72	-15.38		2.21	-29.14
		4.55	*-2.36*		*3.26*	*-4.07*
SHIW		-0.62	6.95		-1.46	-5.26
		-0.81	*1.11*		*-1.67*	*-0.58*
Public Social Expenditure interaction:						
EU-SILC ind.			0.27			0.22
			4.50			*1.93*
GSOEP			1.05			1.88
			2.53			*4.01*
SHIW			-0.94			0.34
			-1.44			*0.34*
N	148	134	130	148	134	130
r2	0.82	0.85	0.87	0.76	0.80	0.81

Robust *t* statistics accounting for country clustering in italics below the slope coefficients.
All regressions include a constant.