

SPECIALS

Israel's Globalization
Episodes: Lessons for
Open Economies

Assaf Razin

The New ifo Business
Climate Index for
Germany

*Stefan Sauer and
Klaus Wohlrabe*

SPOTLIGHT

Unexpected Rapid
Fall of Wind and Solar
Energy Prices: Back-
ground, Effects and
Perspectives

*Adelina Jashari, Jana Lippelt
and Marie-Theres von Schickfus*

TRENDS

Statistics Update

FOCUS

Income Inequality in the EU

*Giuseppe Bertola, Carlos Vacas-Soriano and Enrique Fernández-Macías,
Reto Foellmi and Isabel Z. Martínez, Paul Hufe and Andreas Peichl,
Wiemer Salverda, Alexander Guschanski and Özlem Onaran*



CESifo Forum
ISSN 1615-245X (print version)
ISSN 2190-717X (electronic version)

A quarterly journal on European economic issues
Publisher and distributor: ifo Institute, Poschingerstr. 5, D-81679 Munich, Germany
Telephone ++49 89 9224-0, Telefax ++49 89 9224-98 53 69, e-mail ifo@ifo.de
Annual subscription rate: €50.00
Single subscription rate: €15.00
Shipping not included
Editor: Chang Woon Nam (nam@ifo.de)
Indexed in EconLit
Reproduction permitted only if source is stated and copy is sent to the ifo Institute.

www.cesifo-group.de

FOCUS

Income Inequality in the EU

- Inequality and Market Integration: Direct Effects and Policy Implications in EMU 3
Giuseppe Bertola
- Income Inequality in the Great Recession from an EU-wide Perspective 9
Carlos Vacas-Soriano and Enrique Fernández-Macías
- Inequality in Switzerland: A Haven of Stability? 19
Reto Foellmi and Isabel Z. Martínez
- Inequality and Unfairness in Europe 26
Paul Hufe and Andreas Peichl
- Household Income Inequalities and Labour Market Position in the European Union 35
Wiemer Salverda
- Determinants of the Wage Share: A Cross-country Comparison Using Sectoral Data 44
Alexander Guschanski and Özlem Onaran

SPECIALS

- Israel's Globalization Episodes: Lessons for Open Economies 55
Assaf Razin
- The New ifo Business Climate Index for Germany 59
Stefan Sauer and Klaus Wohlrabe

SPOTLIGHT

- Unexpected Rapid Fall of Wind and Solar Energy Prices: Backgrounds, Effects and Perspectives 65
Adelina Jashari, Jana Lippelt and Marie-Theres von Schickfus

TRENDS

- Statistics Update 70

Income Inequality in the EU

Giuseppe Bertola

Inequality and Market Integration: Direct Effects and Policy Implications in EMU

Cohesion is one of the European Union's objectives, along with growth and stability. In the Economic and Monetary Union (EMU), however, these objectives are only targeted by ineffective coordination frameworks and small spending programmes. Economic integration was meant to be a source of economic growth and efficiency, particularly through market-size and product diversity effects. It was also supposed to promote cultural and institutional convergence across countries, as well as imitation and competition among policy systems. Relatively little attention was paid to the effects of international market integration on income inequality within countries, despite its obvious political relevance. In all industrialised countries, and especially in continental European ones, welfare state policies are far more extensive than the European Union's structural, cohesion, and social funds. At a share of a European Union's budget that hovers around 1 percent of aggregate income, the latter are hardly significant compared to national social protection expenditure which, even excluding pensions, amount to some 10-20 percent of income in member countries.

This article focuses on the implications of international economic integration for inequality among each nation's citizens; and for national policies that influence inequality in politico-economic equilibrium. Empirically, the closer economic integration implied by EMU was associated,

on average, with higher intra-country inequality. Around that trend, member countries' inequality indicators display wide swings that are correlated with country-specific average income changes, and are largely symmetric before and after the crisis. Simple theoretical mechanisms can explain these phenomena as a straightforward implication of EMU's institutional configuration. While unsurprising in hindsight, higher inequality is problematic, and not what European citizens expected from EMU. Market integration and policy competition may well improve efficiency and help to achieve economic growth objectives, but their inequality implications make it more difficult to achieve political stability and social cohesion at the member country level.

This article reviews the message conveyed by the data, refers to broader evidence, while outlining theoretical explanations of the facts, and concludes by discussing their institutional and political relevance.

A FEW FACTS

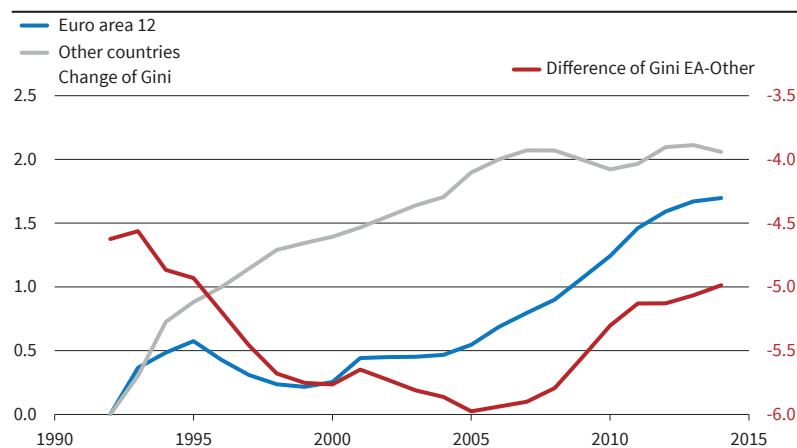
Figure 1 plots population-weighted averages of a standard country-specific inequality indicator against time, separately for the group of countries that joined the Eurozone early¹ and for the other mostly developed

¹ This group includes Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.



Giuseppe Bertola
Università di Torino

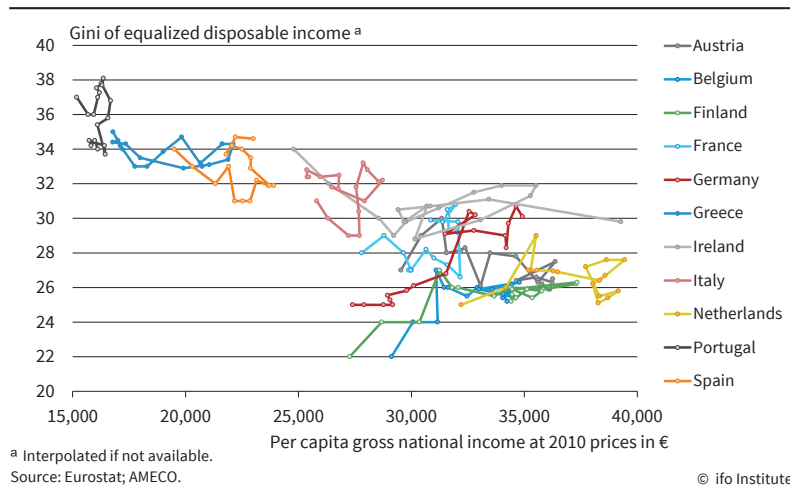
Figure 1
Population-weighted Averages of Gini Coefficients of Disposable Income Inequality



Source: Solt (2016).

© ifo Institute

Figure 2
Country-specific Average Income and Income Inequality, 1998–2015



countries² included in the Solt (2016) database. In the first group inequality was on average stable or decreasing in the 1990s, and subsequently began to increase quickly. The figure also plots the difference in average inequality in the two groups. Inequality is, on average, always lower in the continental European countries that form the bulk of the Eurozone than in the comparison group of countries that did not integrate as tightly. However, the difference becomes narrower as of 2005 and, especially, after the 2008 crisis.

Figure 2 plots the 1998–2015 paths of country-specific average income and income inequality for the countries that adopted the euro around 2000 (Luxembourg is omitted). It conveys an impression of large and heterogeneous changes that, like the sharply increasing path of average inequality in Figure 1, is not good news for anybody who hoped EMU would foster cohesion.

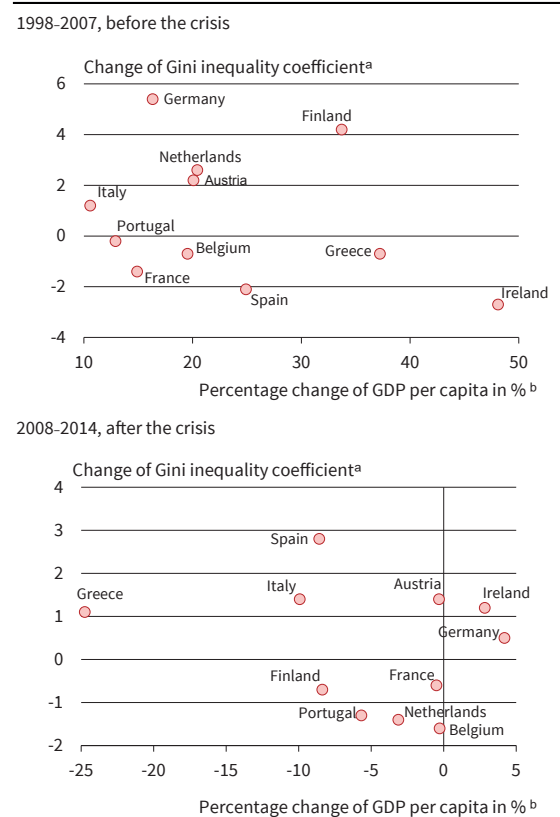
Figure 3 isolates some changes in the same data over two periods. The top panel starts when the euro was first adopted and stops just before the crisis; the bottom panel covers the crisis. There are, of course, many explanations for aggregate income and income inequality dynamics at the country level. Finland is similar to other Northern European countries in many respects, but was recovering from a deep crisis when it joined the Eurozone; the pre-crisis boom was cut short much sooner in Portugal than in other peripheral countries; the crisis was asymmetric and so was recovery across countries; and the data only imperfectly measure the phenomena of interest (average income is particularly difficult to measure and interpret in Ireland, where multinational operations would imply a very sharp GDP increase if the post-crisis period were to include 2015). But the broad-brush picture painted in Figure 3 suggests that

² Australia, Britain, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Hungary, Iceland, Japan, Korea, Latvia, Lithuania, Malta, Mexico, New Zealand, Norway, Poland, Romania, Slovakia, Slovenia, Sweden, Switzerland, Turkey and United States.

changes in income averages and inequalities are often related. In the top panel some countries, notably Germany, experience both relatively slow growth and a relatively large increase in inequality; while the opposite is true of other countries like Spain and Greece. The bottom panel shows a broad reversal in fortunes: during the crisis Germany’s income levels and inequality were relatively stable, while Greece and Spain suffered not only large output declines, but also increasing inequality.

A relevant source of variation for the data displayed in the figures must be the impact of international economic integration on average incomes and their inequality. Some of these effects are complicated and ambiguous. When markets operate across national borders, new types of shock and new channels of adjustment become relevant. Growth and inequality developments are the result of common and country-specific technological

Figure 3
Variation of Country-specific Average Production and Income Inequality in EMU



^a Gini coefficient of equalised disposable income, interpolated if not available.
^b Gross domestic product at 2010 levels/total population.
Source: Eurostat; AMECO.

© ifo Institute

developments, and of globalization, which had different implications for countries that within Europe specialized in sectors that compete with or are complementary to those where emerging countries have a comparative advantage.

In the Eurozone's experience, however, the initially tighter international integration of financial and other markets implied and the disintegration triggered by the crisis did, in interesting respects, conform to the less ambiguous theoretical implications, discussed next, of international economic integration for personal income distribution when production factors are distributed unevenly across and within countries.

THE DIRECT INEQUALITY IMPACT OF INTERNATIONAL INTEGRATION

In the absence of other distortions, the removal of international market barriers would certainly benefit 'representative' individuals who own factors in each country's average proportion: in undistorted markets exchanges are voluntary, hence they must be beneficial. Within each country, however, international factor mobility or factor reallocation between import and export sectors lowers the market income of factors that were scarcer in autarky. Redistributing the gains from trade would, in principle, make it possible to allow all individuals to benefit from economic integration. In practice, doing so would require unrealistically detailed information and policy instruments. Hence, international economic integration changes the distribution of income distribution across individuals who own different factors in different proportions within each country, and may very well damage individuals who mostly own factors that are less scarce in the integrated economy than in autarky. International markets increase the incomes of hypothetical country-specific representative individuals, but also raise or lower the incomes of many real-life individuals.

Gainers and losers are not the same in different countries and different historical contexts, and international economic integration may increase or decrease inequality in specific countries. In the 19th century, intercontinental trade made land less scarce and reduced rich landlords' income and benefitted labourers in European economies (O'Rourke 2001). In the more recent wave of globalisation, integration with poorer countries plausibly increased inequality in rich countries, as their poor citizens' incomes were bid down by competition from workers in poor countries. Inequality in most advanced countries did begin to increase towards the end of the 20th century, reversing a previous declining trend. 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, this is because the extent of economic integration is shaped by progress in transportation and communication technologies,

as well as by trade liberalization and other policy trends. On the other hand, it is due to the fact that the two phenomena have similar effects on the distribution of incomes in advanced countries.

The sharp and precisely-timed economic integration implied by EMU offers an opportunity to observe its implications more clearly. Factor prices can influence personal income inequality through a variety of economic integration channels: not only trade and migration, but also capital flows, which stand out clearly in early EMU data. Differences in capital abundance, rooted in historical experience and in demographic and other determinants of savings rates, triggered not only new opportunities for trade in goods with different factor contents, but also highly visible financial flows, as capital went 'downhill' towards economies where its relative scarcity offered higher returns. Labour is less mobile than capital and ownership of the latter is more concentrated. If wealth is more unequally distributed than other income sources within each country, theory predicts that inequality should increase in capital-rich countries, where wealthier individuals can enjoy the higher rate of return offered by investment in capital-poor countries, and that it should decline in countries where capital inflows bid down returns on wealth and raise wages and employment. In the early 2000s increasing income inequality was indeed positively and significantly associated with current account surpluses not only in Germany, but more generally across EMU member countries (Bertola 2013 and 2016).

FROM INTEGRATION TO INEQUALITY THROUGH POLICY

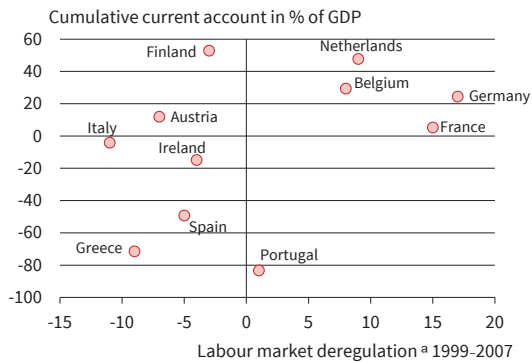
To interpret the evidence, it is important to consider the implications of economic integration not only for market income inequality directly, but also for the policies that aim to reduce income inequality in each country, and in EMU continue to do so independently, even as markets integrate.

In Figure 2 above, inequality tends to be lower in EMU member countries with higher per capita income. In this group, and more generally, policy reduces inequality more strongly in richer countries: for example, social protection expenditure as a percent of GDP is positively correlated with per capita GDP, and negatively related to inequality (see Bertola 2010b). While some redistributive policies may increase productivity at the same time as they reduce risk and inequality (a welfare safety net may encourage entrepreneurial innovation, and job security may similarly give appropriate risk-taking incentives to employees), a more plausible explanation for the more generous welfare policies of richer countries is that higher income makes it easier to afford the luxury of more extensive redistribution at the cost of lower production efficiency.

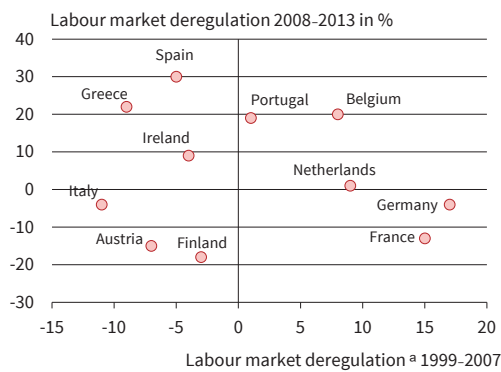
Focusing on factor incomes as a determinant of personal income distribution offers sharp insights not

Figure 4
Labour Market Deregulation Patterns in EMU

Labour market deregulation and international imbalances before the crisis



Labour market reform patterns before and after the crisis



^a Cumulative count of the reforms that increase labour market flexibility (see Turrini *et al.* 2015).
Source: Eurostat; LABREF, database DG, EMPL; European Commission. © ifo Institute

only into the direct impact of economic integration on inequality but also into its implications for redistribution policies. Given that labour income is less concentrated than other factor incomes, it is a more important income source for relatively poor households. Thus, policies that shift income towards labour and away from other factors reduce inequality. For example, a wage floor increases worker welfare as long as higher wages are not offset by lower employment along the labour demand curve, and reduces inequality at a price in terms not only of employment, but also of total production and capital returns. Other ‘passive’ policies (like unemployment insurance, worktime regulation and employment protection) have similar effects. They are more prevalent than symmetric ‘active’ policies (like in-work employment subsidies), and this can be explained by democratic decision processes that give a greater weight to the many citizens who predominantly earn labour income than to the relatively small number of wealthy voters.

While competition in well-regulated markets fosters efficiency, competition among policymakers can make policies ineffective (Sinn 2003). To see how international economic integration interacts with national policies that shift income towards workers and reduce capital returns, note that higher wages exact

higher employment prices if capital can move across country borders seeking higher returns. The resulting race-to-the-bottom pressure on competing policies makes them gravitate towards the competitive deregulated equilibrium.

Empirical evidence on policy reactions to economic integration can be gathered by comparing countries that did and did not adopt the euro before and after the event, which was indeed associated with the significantly faster deregulation of product markets, some deregulation of their labour markets, and lower social policy expenditure. In the data, the faster growth of disposable income inequality illustrated in Figure 1 above, and different employment and unemployment developments, are statistically accounted for not by economic integration *per se*, but by its association with changes in labour and social policy indicators (Bertola 2010a and 2010b).

These developments, however, were uneven across countries. After the adoption of the euro, Germany’s *Hartz* reforms quickly brought its labour market towards the deregulated ‘bottom’. Other Eurozone members implemented less drastic reforms, and some reduced their labour market flexibility. A useful summary indicator of these developments is the LABREF database developed at the European Commission’s Directorate General for Economic and Financial Affairs at the initiative of the Labour Market Working Group attached to the Economic Policy Committee of the ECOFIN Council in 2005, and currently maintained by the staff of the Directorate General for Employment, Social Affairs and Inclusion. It contains a classification of measures in a variety of areas and an indicator of how each influences labour market flexibility. A cumulative count of these indicators provides a time-varying measure of each country’s reform stance.

The top panel of Figure 4 shows that before the crisis labour markets were deregulated more in countries that accumulated positive external imbalances, and also tended to display relatively slower average income growth in the top panel of Figure 3, than in countries where capital inflows financed some private or public consumption growth and large investment booms. The bottom panel of Figure 4 shows that reform patterns are largely symmetric before and after 2008. As with the output and inequality patterns in the bottom panel of Figure 3, reform patterns also reversed when the financial and euro crises reversed the previous integration trends.

Bertola (2017) analyses these patterns in greater detail and documents them for other policy indicators too; while Bertola (2016) offers a simple politico-economic explanation for these observations. In EMU wealth differs across countries as well as within them individually, and labour market regulation is chosen to benefit individuals who draw relatively more income from labour within each country. In capital-rich

countries, such individuals are poor relative to their compatriots' average, but become less poor when the market that employs their labour and capital is extended to include capital-poor countries. So, the politico-economic equilibrium in Germany, for instance, should and did swing towards deregulation more strongly than in Spain, for example, where politically-decisive individuals become even more capital-poor. As EMU allowed capital to move more easily across the boundaries of countries with independent labour policies, reforms were related to the countries' different capital intensities, and associated with international financial imbalances as capital flowed towards higher returns.

Both divergent reforms and downhill capital movements were completely natural consequences of financial integration and policy subsidiarity; both increased inequality in countries that experienced capital outflows and decreased it in countries that accumulate negative international imbalances; and both were reversed when the financial crisis made it more difficult and less appealing for rich countries' savings to fund poorer countries' investment and consumption.

ON THE INTERACTION OF MARKETS AND POLICIES

Remarkably, economic integration in Europe moved inequality through policy in the same direction as markets did: in countries where market-income inequality was increasing, labour market deregulation and the decreasing generosity of welfare policies did nothing to keep it in check. As explained above, economic integration has obvious implications for inequality and for the politico-economic determination of country-specific policies that reduce inequality. But these developments are politically uncomfortable in relatively rich countries, where integration may well benefit the country on average, but damage politically crucial, lower-middle-class voters.

As Figure 3 above shows, increasing inequality has often been associated with countries that have relatively slow per capita income growth. Growing inequalities within and across countries challenge the political sustainability of EMU, if they result from, or are perceived to result from economic integration, and if politico-economic equilibrium policies fail to remedy them. Income inequality across countries increases when national government budgets cannot buffer asymmetric shocks (Bertola 2013), and relatively poor workers within each country may suffer the consequences not only of capital outflows, but also of country-specific reforms that reduce the generosity of social policy and make labour markets more flexible.

Before EMU, a single market with multiple currencies was disturbed by devaluations because uncoordinated macroeconomic policies, fixed exchange rates, and free capital mobility were mutually inconsistent. EMU is similarly disturbed by reforms

of its multiple social and labour policies because market integration, subsidiary policies, and politically acceptable inequality also form an inconsistent trinity. In principle, supranational policy stabilisers (like a European unemployment insurance scheme) or effective policy coordination (that would control the excesses of both deregulation and re-regulation) could keep the centrifugal forces and tensions arising from exposure to systems competition between politically crucial policies in check. In practice, harmonising social and labour policies would be much more difficult than even adopting a single currency was. The member countries of EMU pursue similar distributional objectives using a large variety of different instruments, and it would be both politically and technically difficult to design a supranational scheme that could replace, or be added to, the respective historically-determined welfare states of member countries with very different administrative capacities and heterogeneous political majorities.

European integration was exceptionally supported by a mutual interest in preserving peace through the convergence of institutions, cultures, and policies. Other economic gains (like economies of scale and diversity) and non-economic motives (like a desire to achieve consensus on German reunification) had to play a significant role in making integration with capital-poor countries politically acceptable in relatively rich countries, where a democratic majority of relatively poor workers could expect to be damaged by capital outflows and labour market reforms. In countries that suffered from financial disintegration during the crisis, hopes of a quick return to better times were similarly necessary for EMU to survive resentment on the part of relatively poor workers.

Economic integration is not robust, however, if it perturbs national income distribution issues that cannot be addressed by supranational policy action and political processes. It is hard to formulate compromises among contrasting interests across the boundaries of member countries when policies designed to cope with country-specific industrialization are challenged by international market integration, but political interactions still take place mostly at the national level. A solution to this thorny set of problems is not easy to find, but none will ever be found unless the issues arising from the interaction of international market integration and inequality concerns are recognised and analysed clearly.

REFERENCES

- Bertola, G. (2010a), "Inequality, Integration, and Policy: Issues and Evidence from EMU", *Journal of Income Inequality* 8, 345-365.
- Bertola, G. (2010b), "Labour Markets in EMU: What Has Changed and What Needs to Change", in: Buti, M., S. Deroose, V. Gaspar and J. Nogueira Martins (eds.), *The Euro: The First Decade*, Cambridge: Cambridge University Press, 715-758.
- Bertola, G. (2013), *Policy Coordination, Convergence, and the Rise and Crisis of EMU Imbalances*, European Economy - Economic Papers 490, Brussels: European Commission DG Economic and Financial Affairs.

Bertola, G. (2016), "Labor Policies and Capital Mobility in Theory and in EMU", *European Economic Review* 87, 62-77.

Bertola, G. (2017), *EMU and Labor Market Policy: Tensions and Solutions*, European Commission DG Economic and Financial Affairs, European Economy Discussion Paper 054.

O'Rourke, K.H. (2001), *Globalization and Inequality: Historical Trends*, NBER Working Paper 8339.

Sinn, H.W. (2003), *The New Systems Competition*, Oxford: Blackwell Publishing.

Solt, F. (2016), "The Standardized World Income Inequality Database", *Social Science Quarterly* 97, 1267-1281.

Turrini, A., G. Koltay, F. Pierini, C. Goffard and Á. Kiss (2015), "A Decade of Labor Market Reforms in the EU: Insights from the LABREF Database", *IZA Journal of Labor Policy* 4, 12.

*Carlos Vacas-Soriano and
Enrique Fernández-Macías*

Income Inequality in the Great Recession from an EU-wide Perspective¹

INTRODUCTION

Inequality features as a highly discussed topic in recent years in academic and policy debates in European and developed countries. Already during the 1990s and early 2000s, even though most European countries benefitted from economic growth and employment expansion, concerns emerged about existing income disparities between European countries, especially against the background of the European Union (EU) enlargement towards the East, while empirical studies unveiled trends towards growing income inequalities among many advanced economies over the past three decades (OECD 2008).

The concerns over inequality levels were exacerbated by the Great Recession. The financial crisis emerging by the end of 2008 and the debt crisis that ensued affected European economies and labour markets negatively. The impact of the crisis was uneven across countries, economic activities and demographic groups and had the potential to cause larger income disparities, both between European countries and within European societies, which are perhaps not being corrected by a recovery that is sluggish across many European countries. Growing inequalities have been pointed as well as a potential factor in causing the crisis and at the same time delaying the recovery from it.

While trends in inequalities at the country level have been commonly covered by empirical research, very few studies have mapped income inequalities adopting a truly EU-wide perspective which takes into account not only income disparities within European countries but as well as between them. This is surprising given the process of economic integration taking place between European countries for decades and the implicit assumption found in many EU policy documents that it should result in some degree of convergence between member states. Recent developments affecting the EU make such EU-wide analysis particularly relevant: the European project, which deepened its economic integration with the adoption of the euro and underwent an enlargement towards the East, has recently been put to test by the

Great Recession, whose impact was much stronger in the European periphery (European Central Bank 2014).

Against this background, this paper has two main objectives. On the one hand, to map trends in income inequality from an EU-wide perspective, looking at the evolution of income disparities both within and between European countries, identifying the existence of income convergence and divergence trends between countries. On the other hand, to provide an updated picture on the evolution of income inequalities across European countries that incorporates the effects of the Great Recession and the main forces behind such trends. Most of our analysis focuses on household disposable income data from the European Union Statistics on Income and Living Conditions (EU-SILC) for the period 2005–2016, with income data referring to the period 2004–2015.

The paper is divided into four sections. The first section will introduce the relevant literature on the evolution of EU-wide income inequality and the role played by income convergence between European countries. Section 2 presents trends in income inequalities from an EU-wide perspective over the past decade and how they were shaped by developments in income disparities between and within European countries. The third section provides a more detailed picture of changes in income differentials between countries, followed by the fourth section which looks at the evolution of income inequalities within countries and the main underlying forces. The final section concludes with a summary of the findings and a discussion of some policy implications.

THE EVOLUTION OF INCOME INEQUALITY FROM AN EU-LEVEL PERSPECTIVE: A LITERATURE REVIEW

Some authors have developed an empirical strand of the literature mapping income inequalities from a global perspective (Milanovic 2005), but similar studies aimed at comprehensively studying inequalities in the EU from a supranational perspective are scarce, despite early calls pointing to the need for such studies.² Adopting a truly European approach to cover income inequalities requires taking into account the evolution of income disparities both between and within European countries, which means the expected evolution of EU-wide income inequalities over the period covered in this paper will depend on the evolution of its two referred components.

On the one hand, EU-wide income inequality is affected by the evolution of inequalities across European countries. The expected evolution of

² More than two decades ago, Tony Atkinson (Atkinson 1995; cited in Brandolini 2007) stated: “if the Community continues to assess poverty purely in national terms, taking 50 percent of national average income, then the impact of growth on poverty in the Community will depend solely on what happens within each country. However, a central question concerns the possibility of moving to a Community-wide poverty line, with the same standard applied in all countries. In that case, the effect of growth on the extent of low income is affected by the relative growth rates of different member countries”.



Carlos Vacas-Soriano
European Foundation
for the Improvement
of Living and Working
Conditions (Euro-
found), Dublin



Enrique
Fernández-Macías
European Commis-
sion's Joint Research
Centre, Seville

¹ The European Foundation for the Improvement of Living and Working Conditions (Eurofound), a research agency of the EU, funded the research project on which the contribution is based.

income inequality over the business cycle is especially relevant given the importance of the recession that emerged during the period covered in this paper. Income inequalities are theoretically counter-cyclical, increasing during downturns (Storesletten *et al.* 2004; Bonhomme and Hospido 2012). Although results are country-specific and heavily dependent on institutional factors, empirical studies tend to confirm this counter-cyclicality in the evolution of net income and unadjusted annual labour earnings, which is largely due to the mediating role played by unemployment in depriving individuals of labour income (Maestri and Roventini 2012).

This means income inequalities across European countries (and likely for the EU-aggregate as a result) should have generally declined prior to the crisis against a background of economic expansion and employment creation, and should have experienced an upwards trend from the onset of the Great Recession when the general economic and employment outlook turned bleak. The expected evolution of income inequalities as a result of the crisis would add to the trend towards widening income differentials within many European societies from the 1970s identified in recent major empirical studies (OECD 2011). These studies carried out before the outbreak of the crisis identified widening wage inequalities as the main driver behind such trends: “the widening has affected most (but not all) countries ... but the increase in inequality – though widespread and significant – has not been as spectacular as most people probably think it has been” (OECD 2008).

On the other hand, EU-wide income inequality is also affected by the evolution of income differentials between European countries. Over the medium and long-run, mainstream theories of economic growth would predict a process of income convergence between European countries over the medium and long-term, due to catch-up growth in lower-income countries, where capital is scarcer and higher investments would take place as a result of the higher expected returns to capital investment. Nevertheless, the Great Recession emerged as a force that could have negatively affected this process of income convergence over the short-run due to its generally stronger impact among peripheral economies than among core European countries (ECB 2014).

This means EU-wide income inequalities should have been impacted downwards as a result of a process of income convergence between European countries, although this trend could have been affected by the Great Recession. The very limited number of available empirical studies tend to confirm this picture of declining EU-wide income inequality levels due to narrowing income disparities between European countries prior to the crisis, after which EU-wide income inequality remained rather stable (Darvas 2016) or increased (Dauderstädt and Kelttek 2014).

This paper maps the evolution of inequalities in household disposable income from an EU-wide

perspective over the past decade and, in doing so, it looks at its business-cycle evolution and how it has been impacted by the Great Recession, it identifies the role played by income convergence between European countries, and it provides an updated picture of the evolution of income inequalities across European countries and the main underlying forces.

MAPPING INCOME INEQUALITY TRENDS FROM AN EU-WIDE PERSPECTIVE OVER THE PAST DECADE

This section presents data on EU-wide inequalities by using a measure of household disposable income, which is then distributed in equal parts among all those individuals at the household by using an equivalence scale (keeping then only those aged 15–65 in the analysis) and made comparable across countries by using purchasing power parities (PPP).³ Adopting a truly European perspective to study income inequality requires considering all income earners across European countries as part of a single EU-wide income distribution which would be affected by income disparities both between and within member states.

A picture of this single European income distribution in 2015 (income referring to 2014, given the one-year lag of EU-SILC’s income data) is provided by Figure 1 below, depicting the proportion of European individuals aged 15–65 (vertical axis) reporting different levels of equivalised household disposable income (horizontal axis, each bar representing people found at a specific PPP-adjusted 1,000-euro interval). It shows that around 4.5 percent of Europeans of working age have an (equivalised) household disposable income between 10,000 and 11,000 euros per year, for instance.

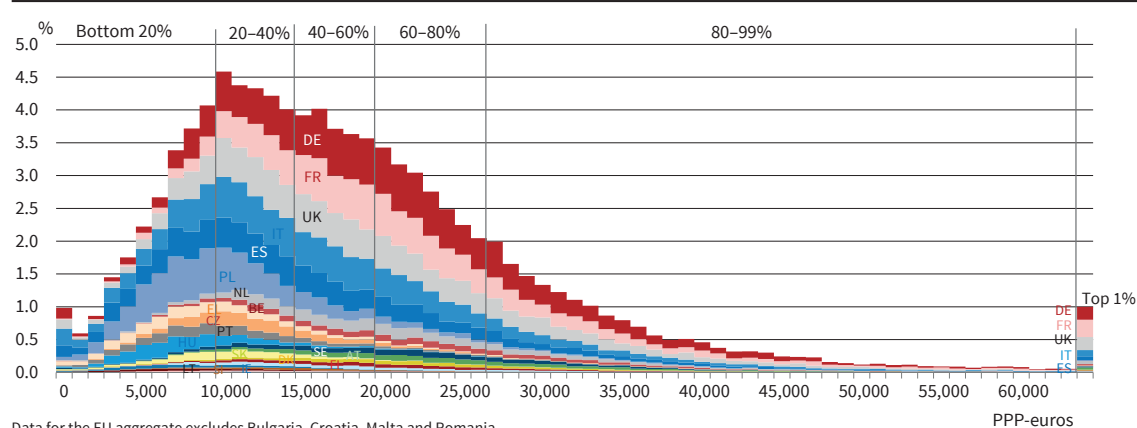
The figure reflects two important aspects of the EU income distribution. One, the different positions occupied by European countries reflects the income disparities between them, with Eastern European countries (and Mediterranean countries to a lesser extent) relatively more present at the bottom 20 percent of the EU-wide income distribution and EU15 countries at the top income quintile. Two, national income distributions overlap considerably (e.g. the countries dominating the top quintile also have a significant share of population in the lowest income quintile), which means that income disparities within countries are larger than those between countries for the EU aggregate.

A picture of EU-wide income inequality trends over time and, importantly, its decomposition into those changes due to between-country and within-country developments is provided in Table 1 below. Two main insights emerge from the data. One, EU-wide income inequality levels for the EU have been clearly influenced by the crisis. The Gini (and the Theil) index for household

³ A detailed methodology is provided in Eurofound (2017) on which this paper is based. Data comes from EU-SILC, whose income data has a one-year lag and refers to the year previous to the one in which the survey is conducted. This lag must be taken into account in the figures and tables presented in the paper.

Figure 1

EU-wide (Equivalised) Household Disposable Income Distribution, 2015



disposable income declined significantly prior to the crisis, and the Theil index shows that this was almost entirely due to a reduction in the differentials in average income between countries, while the within-country inequalities component declined only very slightly. These trends were reversed by the crisis, as EU-wide income inequalities registered a modest upwards trend from 2009 (income data referring to 2008), due to a halt in the process of income convergence between European countries and to a slight increase as well in the component capturing income inequalities within countries.

Two, the contribution of income disparities between and within European countries to explain changes in EU-wide income inequality has very different features over the last decade. On the one hand, the EU has been able to generate a considerable income convergence between its member states and, even though it has stalled from the onset of the crisis, the reduction of income disparities between European countries has played a key role in driving EU-wide income inequalities downwards over the last decade. On the other hand, the component capturing income inequalities within countries has remained much more stable over the period but within-country inequalities represent the lion's share of EU-wide income inequality, and increasingly so due to the abovementioned process of income convergence, representing from around 78 percent of EU-wide inequalities by the beginning of the period to 85 percent by the end of the period.

These results are very relevant from a European policy-making perspective. Firstly, they provide support for the implicit assumption of EU policy documents that European economic integration should lead to convergence between countries and, moreover, they would vindicate the regional development policy deployed by the European institutions from decades ago, targeted at poorer regions and member states.⁴ Nevertheless, the income convergence between European countries has been halted by the impact of a Great Recession, which has put the European project to test. More detailed data at the national level and follow-up during the following years are needed for a more adequate assessment of the status of this process of income convergence.

Secondly, given that within-country inequalities currently explain an overwhelming proportion of EU-wide income inequalities, those policies aimed at reducing income inequalities at the national level would offer the greatest prospect in the future, since they would tackle inequalities both within European countries and for the EU as a whole. European-level policies aimed at enhancing the inclusiveness of the more vulnerable societies (such as the European Social Fund or the European Globalisation Fund) and national policies addressed to helping the less well-off individuals and households within European societies

⁴ Some researchers conducting independent evaluations have found that the cohesions policies implemented by the EU *via* the regional developments funds have promoted catch-up in less developed member states (Rodriguez-Pose and Garcilazo 2015).

Table 1

EU-wide (Equivalised) Household Disposable Income Inequality: Theil and Gini Indexes

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Gini	0.349	0.340	0.338	0.337	0.329	0.331	0.333	0.332	0.334	0.336	0.335
Theil	0.224	0.207	0.206	0.210	0.195	0.198	0.204	0.198	0.202	0.201	0.202
Theil-between	0.050	0.042	0.041	0.036	0.030	0.030	0.030	0.032	0.032	0.031	0.030
Theil-within	0.174	0.165	0.165	0.174	0.165	0.168	0.174	0.166	0.170	0.170	0.172

Note: Data for the EU aggregate excludes Bulgaria, Croatia, Malta and Romania, which are not available for all years over the period covered.

Source: EU-SILC.

(such as minimum wages, unemployment and family benefits or training and other up-skilling measures) would offer a good policy-mix if reducing EU-wide income inequalities was an explicit policy objective.

A CLOSER PICTURE OF THE CONVERGENCE IN INCOME DISPARITIES BETWEEN EUROPEAN COUNTRIES

This section provides a more detailed picture of the reduction in income differentials between European countries over the past decade identified earlier by providing the country-level dynamics that characterise it. Moreover, while data for the EU aggregate included 24 European countries over the period 2005–2015, the analysis here incorporates EU-SILC data for all EU28 countries and up to 2016 whenever available. The data presented here refers to average household disposable income levels expressed in PPP-euro across European countries, which permits capturing real income convergence processes between European countries in terms of purchasing power and not merely caused by inflation differentials.

The process of income convergence between European countries suffered clear mutations over the past decade, as illustrated in Figure 2. Prior to the crisis (left panel of the figure), a notable process of income convergence took place due to developments at the top of the income scale and, mainly, among those countries at the bottom of the income scale. Among most higher-income countries, relative income levels remained stable or even declined (in Germany and notably in Britain, although in this case partially due to currency depreciation). Among lower-income countries, most Eastern European states registered a strong catch-up process (very remarkable in the Baltics, Poland and Slovakia), even though Mediterranean countries failed to do so (with the exception of Spain).

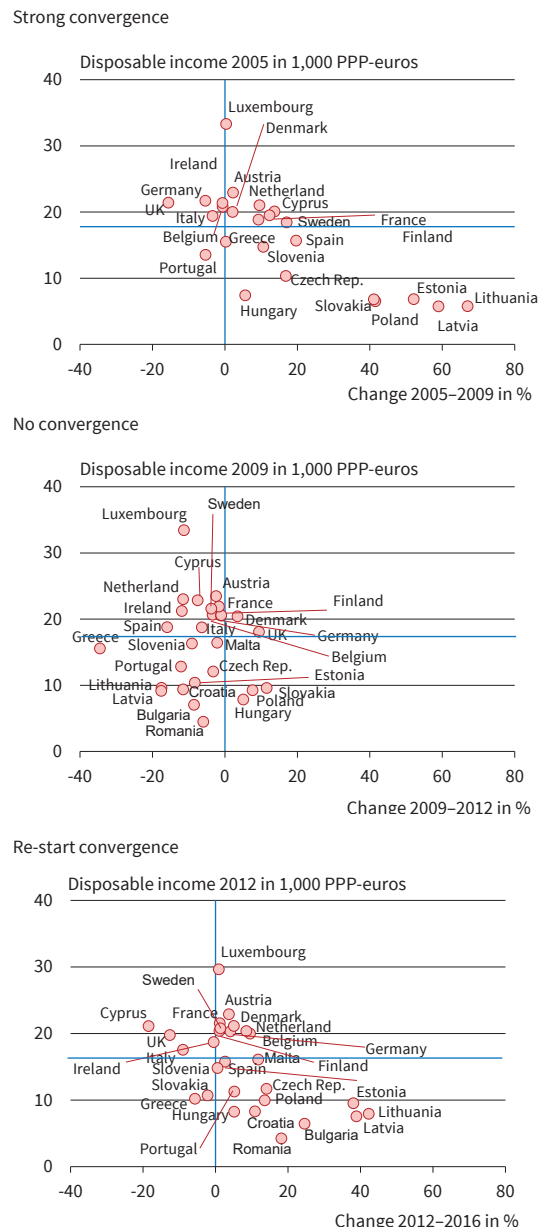
The second panel of Figure 2 clearly reflects how the emergence of the crisis halted the process of income convergence between European countries by reversing the sign of the core-periphery divide, since income levels were more negatively affected in the European periphery (mainly in several Mediterranean and Baltic countries, even though they continued to progress in Slovakia, Poland and Hungary) and they were generally more resilient in the European core (with the exceptions of Luxembourg and the Netherlands). This halt in the process of income convergence between European countries from the onset of the crisis is consistent with the picture provided earlier (see Table 1).

Nevertheless, the third panel of Figure 2 captures the recovery of this process of convergence between European countries in the most recent years (between 2012 and 2016, income data referring to 2011–2015). Again, this process is mainly due to the return of catch-up income growth among most Eastern European countries (notably in the Baltics), which did not extend to Mediterranean countries (the downwards correction

continued in Greece and Italy). Among higher-income countries, income levels remained generally contained.

Although it is weaker than prior to the crisis, the re-emergence of this process of income convergence seems to indicate that the divergence forces unleashed by the Great Recession only had a short-term impact over a longer-term trend towards income convergence between European countries.

Figure 2
Average Household (Equivalised) Disposable Income across Countries



Note: 2008 has been used to distinguish the pre-crisis period, instead of 2009 as before, due to the one-year lag in EU-SILC data. The horizontal blue line refers to the average income for the EU as a whole, although it includes different countries in each sub-period due to data availability. Bulgaria, Croatia, Malta and Romania are included from the second sub-period (2009 Croatian data refers in fact to 2010). The most updated EU-SILC data for 2016 has been incorporated in the most recent sub-period for those countries where it is available (all EU28 countries except Cyprus, Ireland, Italy, Luxembourg and Malta, for which 2015 is used instead). Source: EU-SILC.

Nevertheless, the contrasting example provided by Eastern European and Mediterranean countries warns that this convergence does not have to be taken for granted. While the East of Europe generally managed to attain a real income convergence with the rest of Europe, whatever convergence Mediterranean countries accomplished was the result of higher inflation levels but not of a real income convergence in purchasing terms.

GROWING INCOME INEQUALITIES WITHIN EUROPEAN COUNTRIES AND THE UNDERLYING REASONS

EU-wide income inequality over the last decade was mainly driven by the reduction of income differentials between countries, while the contribution of inequalities within European countries remained much more stable (see Table 1). Nevertheless, the country-level data introduced in this section shows that income inequalities expanded in a majority of European countries from the onset of the crisis mainly due to rising unemployment levels, while European welfare states have managed to cushion the extent of these growing inequalities.

The role of unemployment as the main driver behind rising income inequalities across European countries from the onset of the crisis is unveiled by Figure 3, which compares inequalities in monthly labour income among workers with those in annual labour income among the whole working age population. The difference between both measures of inequality would be explained by the fact that some individuals are out of work and do not have labour income (either for some months or during the whole year, due to unemployment or inactivity).

The figure shows that the crisis pushed inequalities mainly outside employment, since labour income inequalities among the whole working age population moved upwards across most countries from 2009 (income data referring to 2008), significantly so among those countries in the European periphery most affected by growing unemployment (Mediterranean and Baltic countries generally, as well as Ireland, Slovakia or Slovenia) and much more moderately in those countries in the European core less affected by employment turbulences (continental and Scandinavian countries). These labour market turbulences explain why inequalities within employment remained more subdued and even declined in some countries affected by significant unemployment hikes (Greece or Portugal), probably due to a compositional effect caused by the typically lower wages of those leaving employment during a crisis (Bils 1985; Solon *et al.* 1994).

There are three main forces that shape income inequalities when moving from annual labour income into our final measure of household disposable

income: the family pooling of income, capital income and the transfers and taxes of benefit systems – see further details in the methodology provided in Eurofound (2017). Our results show that the role of this third factor has been particularly relevant during the period observed. Figure 4 compares the evolution of inequality in household market income and in household disposable income, whose different behaviour is due to the redistributive effect of the public systems of benefits and taxes. European welfare states reduce market income inequality by almost 30 percent for the EU as a whole, although country differentials are notable, as reflected by the gap between both measures of inequality in each country.

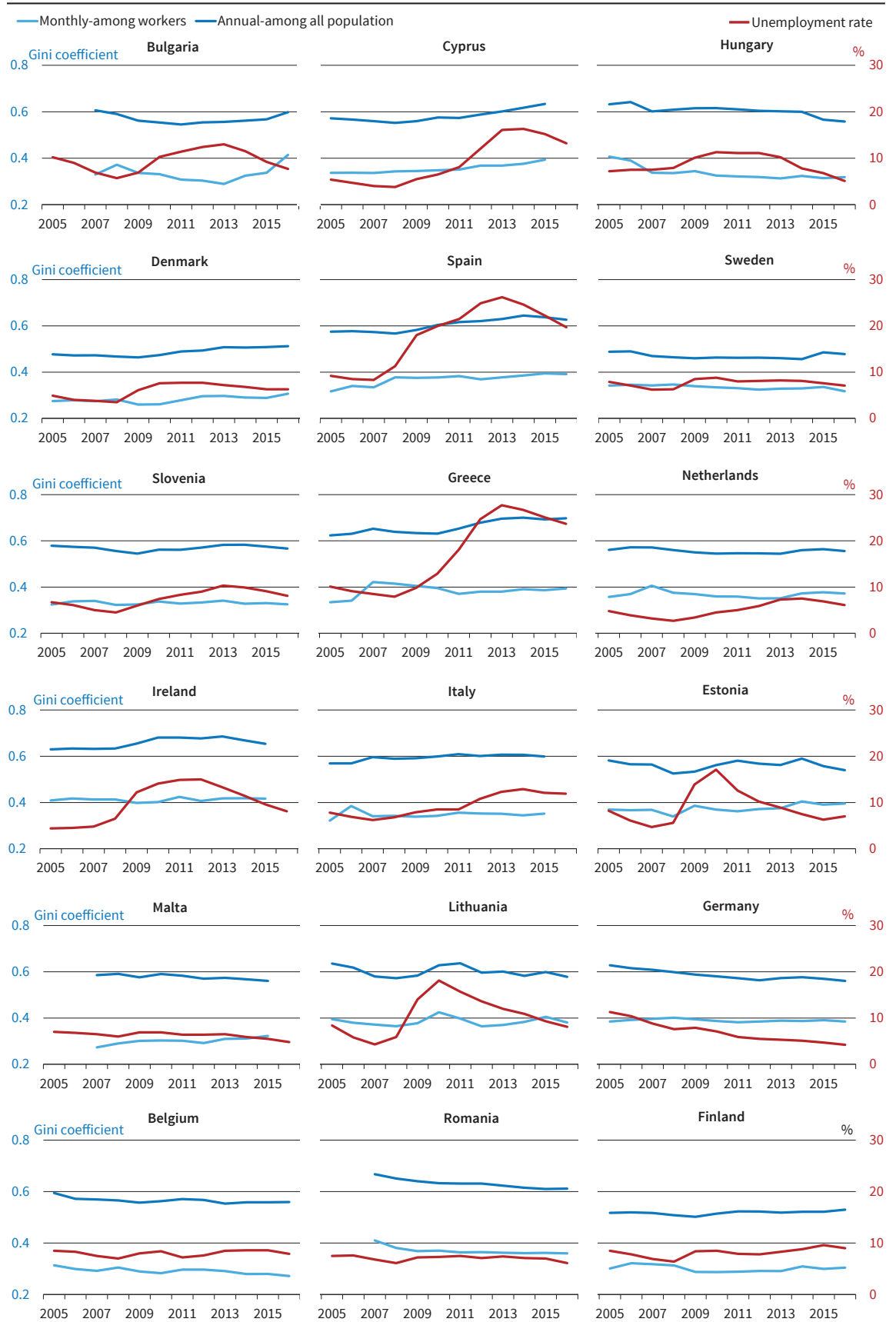
Importantly, our results over the whole period clearly reflect how European welfare states largely cushioned the increase in market inequalities as a result of the crisis, as reflected by the notably larger inequality increases in household market income than in household disposable income across many countries (more relevant in Mediterranean countries generally, Latvia, Belgium, Netherlands, Finland or Britain).

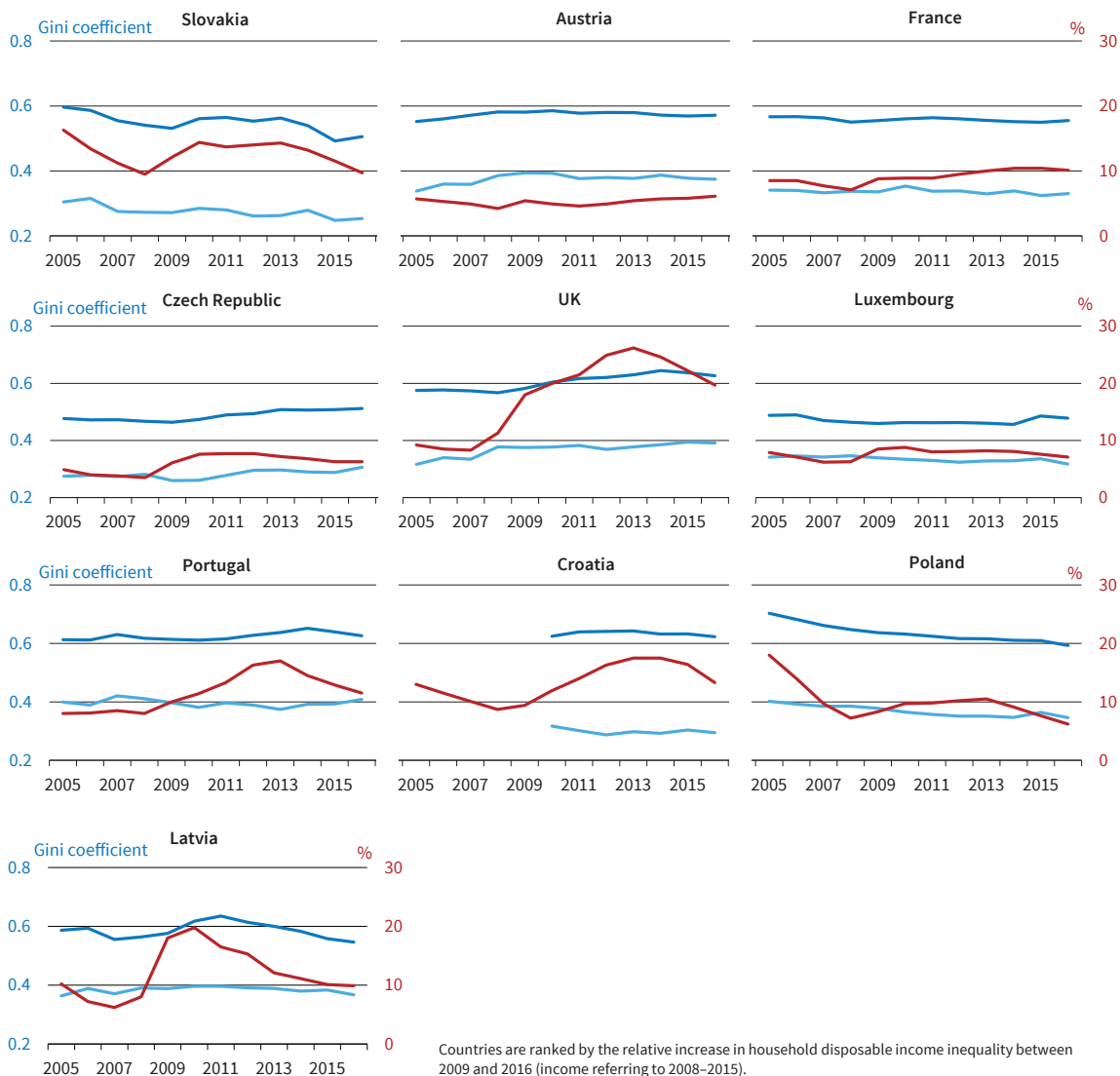
A detailed analysis of our main measure of inequality, that in household disposable (equivalised) income, reveals the pro-cyclical behaviour of income inequalities, as predicted by the literature:

1. Before the crisis, reductions in income inequalities are more common among European countries, significantly in some Eastern European countries.
2. Income inequalities are then pushed upwards from the onset of the crisis in around two thirds of European countries, although the resilience of European welfare states prevented more significant surges. Inequalities increased more notably in several countries in the European periphery where employment turbulences were greater (Cyprus, Hungary, Estonia, Slovenia, Spain or Ireland) but also in other traditionally low-inequality countries (Denmark and Sweden or Germany). This explains the upward trend observed in the within-countries component of EU-wide income inequalities described earlier (see Table 1).
3. Nevertheless, as economic recovery sets foot in the continent in most recent years (between 2014 and 2016, income data referring to 2013–2015), the patterns in income inequality became more mixed and inequality reductions were registered again in more than half of European countries (more significant in some Eastern European countries but also in Germany and Ireland).

This section has revealed an upwards trend in income inequalities among most European countries due to rising unemployment levels from the onset of the crisis, although the increase in income inequalities was rather modest in many cases largely due to the role of European welfare states. Nevertheless, it is important

Figure 3
Inequality in Worker's Monthly Earnings and Individual's Annual Labour Income





Source: EU-SILC; LFS (unemployment rate).

© ifo Institute

to keep in mind that the synthetic indicators of income inequalities as the ones provided here do not capture the whole extent of the impact of the Great Recession on European societies. A more complete picture of the evolution of inequalities and income levels over the last decade is provided in Eurofound (2017).

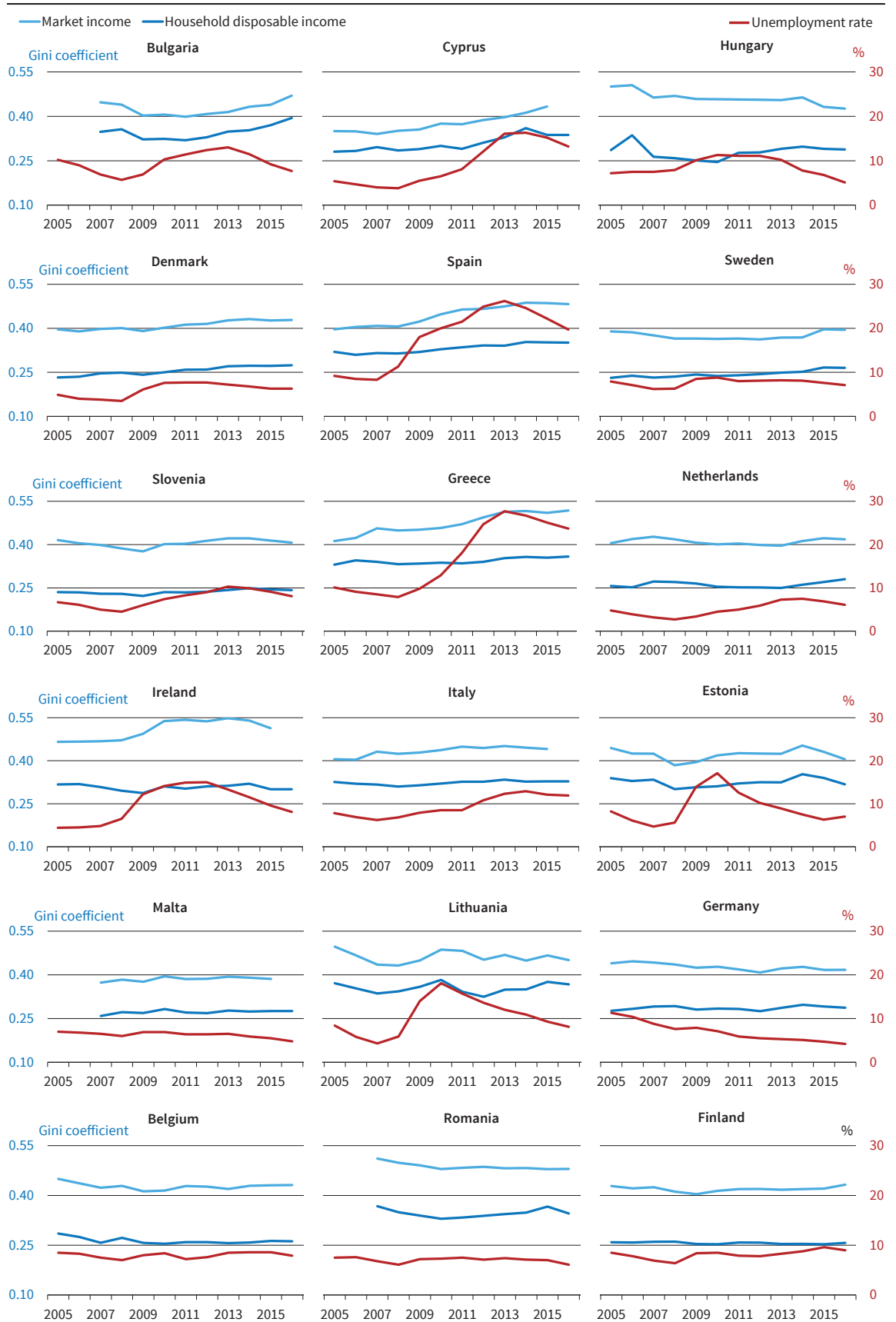
This broader picture shows that real disposable income levels were negatively impacted by the crisis across all European countries, especially among less well-off households in the European periphery but also in countries in the European core. The decline or moderation of real disposable income levels reveals a more significant impact of the Great Recession on European societies than that offered by other indicators such as GDP per capita or inequality indexes, which highlights the importance of using a wide set of indicators when monitoring economic developments and well-being among European citizens.

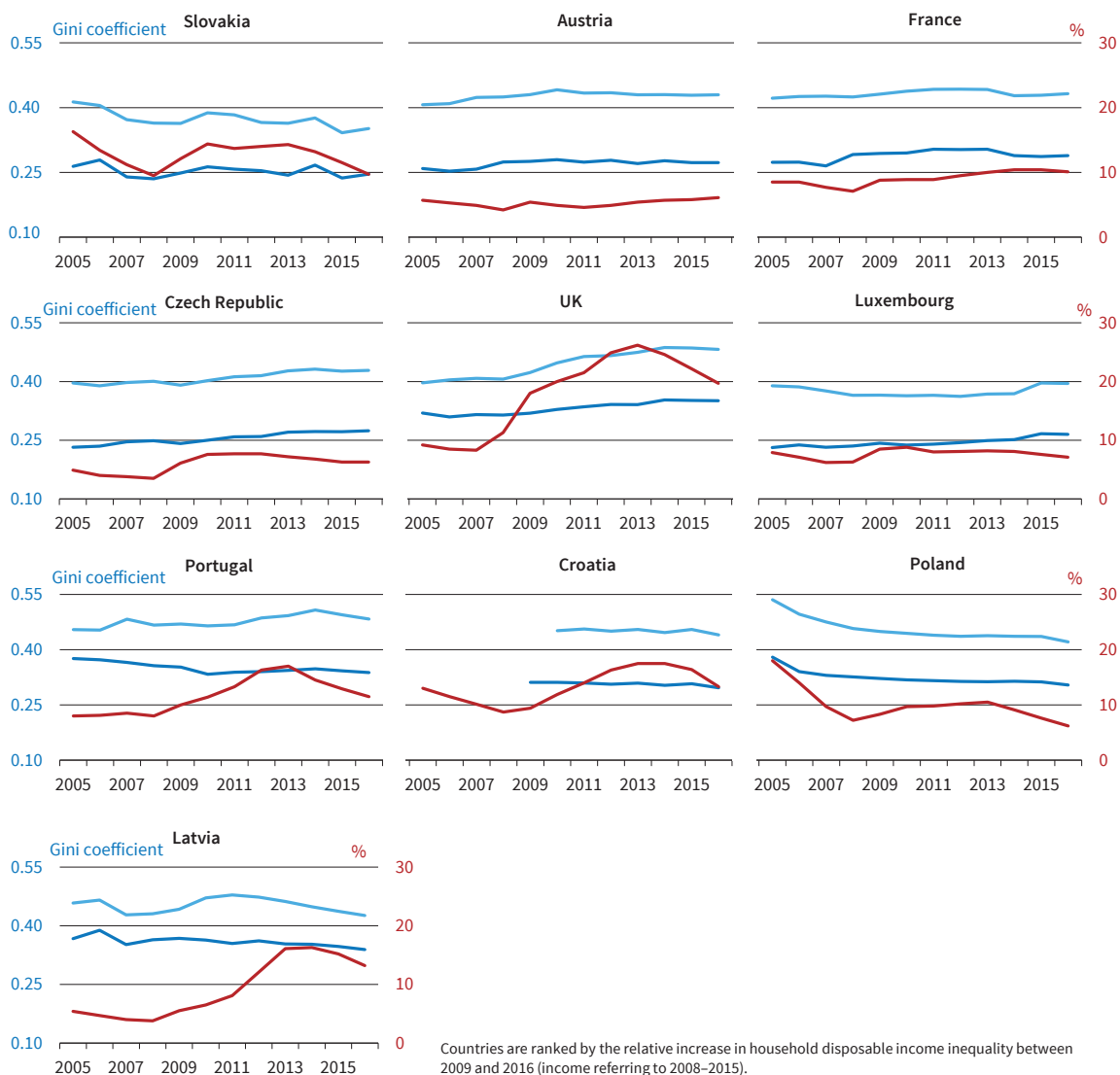
CONCLUSIONS

This paper has provided a picture of income inequalities from an EU-wide perspective and the extent to which they have been driven by income differentials between and within European countries over the last decade. EU-wide income inequality levels were significantly reduced up to the emergence of the crisis in 2008, which pushed them slightly upwards thereafter. Between and within-country income differentials played a different role in explaining such trends.

On the one hand, the evolution of income disparities between European countries is the main driver behind trends in EU-wide income inequalities over the past decade. The notable convergence in average income levels between European countries, mainly due to catch-up income growth in Eastern Europe and moderation in the core of Europe, almost

Figure 4
Inequality in Household Market Income and Household Disposable Income





Source: EU-SILC; LFS (unemployment rate).

© ifo Institute

entirely explains the decline in EU-wide income inequality prior to the crisis. The interruption of this process of convergence as a result of the stronger impact of the crisis in the European periphery largely explains the ensuing stability of EU-wide income inequality. Nevertheless, this process of income convergence is re-activating in the most recent years due again to strong income growth among Eastern European countries.

On the other hand, income inequalities within European countries did not significantly drive EU-wide income inequalities during the period, but are characterised by relevant developments as well. One, within-country income inequalities have reinforced their importance as the main source of the EU-wide income inequality level over the period, explaining 85 percent of it by 2015. Two, income inequalities registered an upwards trend among most European

countries and pushed EU-wide income inequality slightly upwards from the onset of the crisis.

While previous major empirical studies identified widening pay differentials as the main reason behind growing income inequalities in developed countries, our results complement those studies by showing that the growing income inequalities registered among around two-thirds of European countries from the onset of the crisis were mainly due to the role of rising unemployment and its associated loss of labour income. This explains why income inequalities started to moderate among many European countries in the most recent years following economic and employment recovery.

Moreover, our results have important policy implications. Firstly, we have emphasised the important role played by the European benefit and tax systems in cushioning the growing market income

inequalities, especially in some of the countries hardest hit by the crisis. Secondly, our results provide support to the implicit assumption within European institutions that European economic integration should lead to convergence between its member states, a goal also pursued by the regional development policies deployed by the European institutions from decades ago. Our results unveil a strong convergence in income levels over the past decade, despite the divergence trends unleashed by the Great Recession and despite the fact that Eastern European but not Mediterranean countries have benefitted generally from this income convergence process. Thirdly, our data shows within-country income inequalities explain an overwhelming proportion of EU-wide income inequality, which suggests that policies targeted at reducing income inequalities at the national level as those offering the greatest potential to reduce income inequalities in Europe.

REFERENCES

- Atkinson, A.B. (1995), "Poverty, Statistics and Progress in Europe", in: Atkinson, A.B. (ed.), *Income and the Welfare State - Essays on Britain and Europe*, Cambridge: Cambridge University Press, 64–77.
- Bils, M. (1985), "Real Wages over the Business Cycle: Evidence from Panel Data", *Journal of Political Economy* 93, 666–689.
- Bonhomme, S. and L. Hospido (2012), *The Cycle of Earnings Inequality: Evidence from Spanish Social Security Data*, Banco de España Working Paper 1225.
- Brandolini, A. (2007), "Measurement of Income Distribution in Supranational Entities: The Case of the European Union", in: Jenkins, S.P. and J. Micklewright (eds.), *Inequality and Poverty Re-examined*, Oxford: Oxford University Press, 62–83.
- Darvas, Z. (2016), *Some Are More Equal Than Others: New Estimates of Global and Regional Inequality*, Bruegel Working Paper 8.
- Dauderstädt, M. and C. Kelttek (2014), *Crisis, Austerity and Cohesion: Europe's Stagnating Inequality*, Bonn: Friedrich-Ebert-Stiftung.
- Eurofound (2017), *Income Inequalities and Employment Patterns in Europe before and after the Great Recession*, Luxembourg: Publications Office of the European Union.
- European Central Bank (ECB, 2014), "The Impact of the Economic Crisis on Euro Area Labour Markets", *ECB Monthly Bulletin*, October, 49–68.
- European Central Bank (ECB, 2015), *Comparisons and Contrasts of the Impact of the Crisis on Euro Area Labour Markets*, Occasional Paper Series 159.
- Maestri, V. and A. Roventini (2012), *Stylised Facts on Business Cycles and Inequality*, GINI Discussion Paper 30, Amsterdam Institute for Advanced Labour Studies.
- Milanovic, B. (2005), *Worlds Apart: Measuring International and Global Inequality*, Princeton: Princeton University Press.
- OECD (2008), *Growing Unequal? Income Distribution and Poverty in OECD Countries*, Paris.
- OECD (2011), *Divided We Stand: Why Inequality Keeps Rising*, Paris.
- Rodríguez-Pose, A. and E. Garcilazo (2015), "Quality of Government and the Returns of Investment: Examining the Impact of Cohesion Expenditure in European Regions", *Journal of Regional Studies* 49, 1274–1290.
- Solon, G., R. Barsky and J. Parker (1994), "Measuring the Cyclicalities of Real Wages: How Important Is Composition Bias?", *Quarterly Journal of Economics* 109, 1–25.
- Storesletten, K., C.I. Telmer and A. Yaron (2004), "Cyclical Dynamics in Idiosyncratic Labor Market Risk", *Journal of Political Economy* 112, 695–717.

Reto Foellmi and Isabel Z. Martínez Inequality in Switzerland: A Haven of Stability?

INTRODUCTION

Economic inequality is again being widely discussed. The reasons for this are manifold: the rise in inequality observed in many countries, the increased globalization with the entry of former emerging markets into the world market, and the (too) slow recovery after the 2008 economic crisis with uncertain growth prospects. The influential book by Thomas Piketty *Capital in the 21st Century* has raised the topic to a broad social and political sphere, suggesting the introduction of a global wealth or a capital transaction tax. More recently, concerns about effects of continuing automation, digitalization and artificial intelligence on the labor market and the distribution of income and wealth entered the discourse on inequality.

In this article, we discuss evidence on the evolution of top incomes in Switzerland, one of the richest countries in the world. Switzerland is a major industrialized economy with a strong financial sector. Furthermore, the absence of wars and the tax competition between its cantons kept the tax burden relatively low and stable over time. These features render the case of Switzerland interesting to understand how income and wealth inequality evolve in the absence of major shocks.

We investigate how top incomes in Switzerland, which lies at the heart of Europe, have evolved compared to neighboring countries and the United States. We show that in Switzerland, similar to other countries, the share of labor income going to the top 1 percent has increased, implying that the recent rise in top incomes is not just attributable to more concentrated capital incomes. We also present new evidence on the income mobility of top earners in Switzerland, i.e. the question how long someone belonging to the top 1 percent stays within this group. Finally, we shed light on the concentration of wealth.

TOP INCOME SHARES IN COMPARISON TO OTHER INDUSTRIALIZED COUNTRIES

To understand the evolution of the income distribution, the development of high incomes is of particular importance. Although such top income shares are, by definition, related to a small part of the

population, this measure of income concentration is important not only for the overall distribution but also from a fiscal and socio-political perspective. On the one hand, the richest taxpayers make a significant contribution to government revenues. On the other hand, ever-increasing top incomes can lead to social tensions or jeopardize a liberal economic and social order. And when economic elites emerge who seek to influence taxation and distribution policies in their favor in particular, this endangers not least the democratic ideals of modern societies – see Gilens and Page (2014) for an empirical investigation in the US context.

Recent research has documented the long-term evolution of high incomes over the last century to the present in different countries, starting with Piketty (2001) for France. Atkinson and Piketty (2007 and 2010) provide a collection of studies on top incomes for countries around the world. The World Inequality Database wid.world hosts series on top incomes and other inequality measures for an even larger set of countries. The majority of these studies use tax data to estimate the share of total income going to top income groups like the top 10 percent or the top 1 percent. Tax data are particularly well suited because they are available over long periods of time and, unlike survey data, also capture the top income from labor and capital. In addition, the Pareto distribution laws make it possible to determine very precisely the proportions of the total income of the upper income distribution classes – even if only aggregated tax statistics and no individual data are available.

Figure 1 shows the income share of the top 1 percent of taxpayers for different countries. In Switzerland, the share of total income going to the richest percent fell from around 11 percent in the 1970s to 8.5 percent, and then rose steadily from the mid-1990s to reach the 11 percent mark again in 2008. At the same time, the income components that the top 1 percent can claim have recently become more volatile and fluctuate more strongly with the business cycle. This suggests that the top incomes are less stable over the course of the business cycle, although the upward trend continues overall. An international comparison reveals that the recent rise in the top 1 percent in Switzerland has been comparatively moderate. Thus, the top income in Switzerland rose less than in neighboring Germany or in the United States, the front-runner of the increasing income concentration among the rich. In neighboring France, on the other hand, the richest percent of income recipients receive 2 to 3 percentage points less of the total national income than in Switzerland. However, note that the series on France and Switzerland do not include any capital gains (these are tax-free on private assets in Switzerland and are therefore not covered by tax statistics). As the series for the United States and Germany show, including realized capital gains, raises the measured income concentration.



Reto Foellmi
University of
St. Gallen



Isabel Z. Martínez
University of
St. Gallen

Figure 1
Top 1% Income Share for Switzerland and Various Countries
 1905–2015

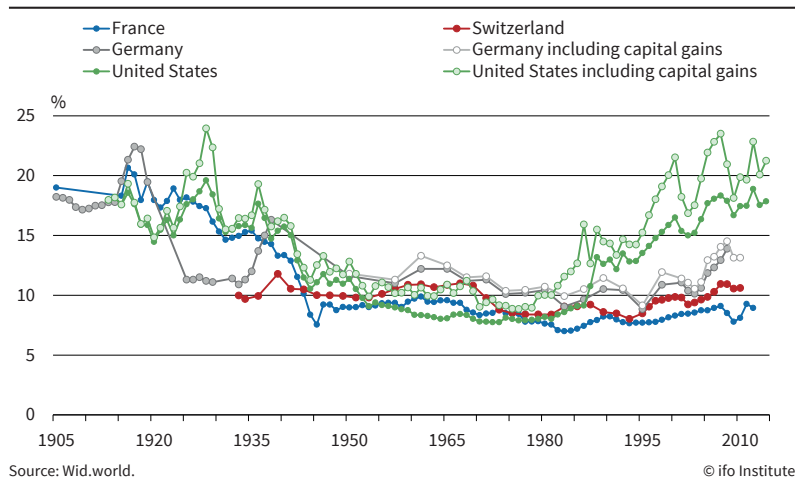


Figure 2
Top 10% Income Share for Switzerland and Various Countries
 1905–2015

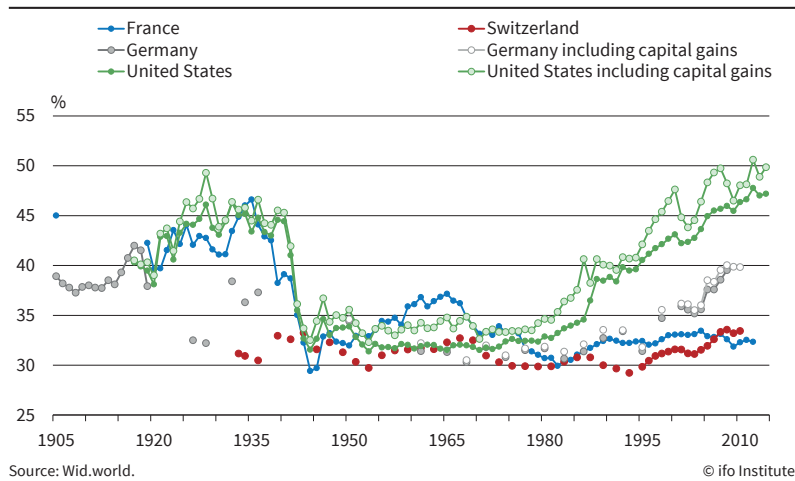
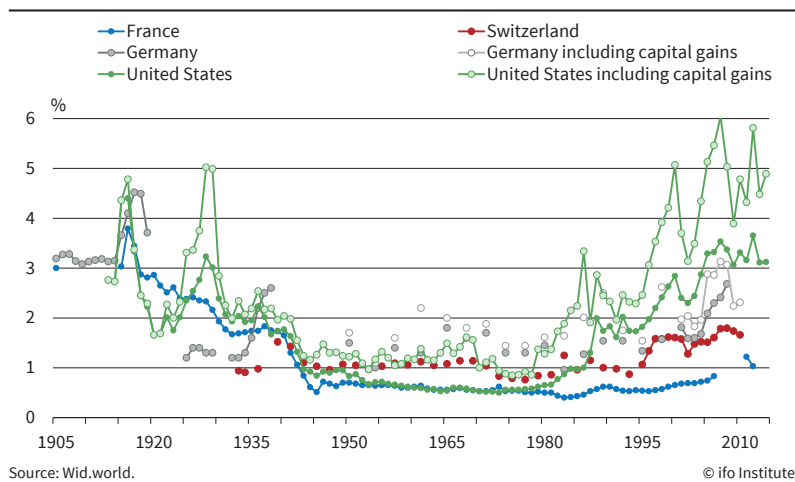


Figure 3
Top 0.01% Income Share for Switzerland and Various Countries
 1905–2015

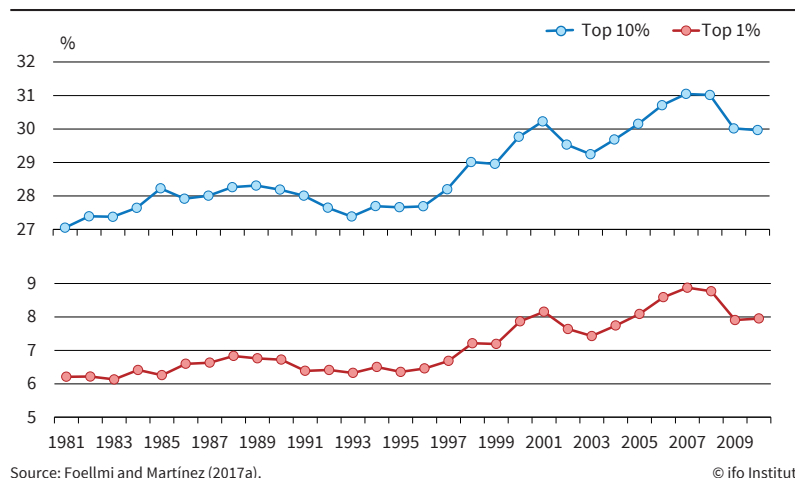


If one focuses on the broader group of the top 10 percent (Figure 2), Switzerland displays a level of income concentration below that of neighboring countries and the United States throughout most of the 20th century. Likewise, the upward trend observed over the past 20 years was moderate in Switzerland. What stands out in the graph, however, is that France barely experienced any increase in top incomes. Looking at different fractiles within the top 10 percent, we find an increasing spread of income distribution at the upper end, which takes place in all countries: the further up one moves along the income distribution, the more concentrated are top incomes (Figure 2).

The income share of the super-rich is also pronounced in Switzerland, albeit to a lesser extent than in countries such as the United States or Germany. While the share in total income of the top 0.01 percent was still slightly above or even below 1 percent until the early 1990s, in the last 20 years it has risen to almost 2 percent – i.e. 200 times the average income. This level is as high as ever since the First World War. Again, France stands out as the country with the lowest concentration in top incomes among the countries compared here. Note, however, how when looking at the very top, the richest 0.01 percent of taxpayers, the Grande Nation also could not escape the global trend of rising top incomes.

What are the reasons behind this development? To shed light on this, we look at labor incomes and the international composition of the top income group. The evolution of the highest labor income is similar to the incomes of the top income

Figure 4
Top Labour Incomes
1981–2010



recipients (Figure 4). This suggests that the observed increase in the highest total income is not primarily due to increasing asset concentration and high capital incomes but is rather driven by (managerial) top salaries. The rise in top salaries implies further that the average salary since the 1990s has increased more than the median salary measured in the social security data.¹

Some economists argue that technological change and the concomitant increase in average company size favor the top talent and earners (see Gabaix and Landier 2008). It is only in a large market that successful decisions by a manager can have a major leverage effect. The same is true when CEOs are rewarded for luck, which has been shown to be the case in earlier research (Bertrand and Mullainathan 2001). In Foellmi and Martínez (2017a), we examined the relationship between top incomes and the market capitalization of listed companies relative to GDP. Switzerland, the seat of many multinational companies, has a very high relative market capitalization by international comparison, which has also risen sharply since the 1990s. The country is attractive to many multinational companies with well-paid top jobs. Market capitalization increased from 80 percent in 1990 to over 300 percent of GDP in 1990, only to converge to around 200 percent of GDP after the financial crisis. These levels are among the highest in the OECD, even before financial centers such as Luxembourg. The United States, with its highly developed stock market, only has a market capitalization of around 100 percent; the values for France and Germany are again significantly lower, at 70 percent and 50 percent, respectively. In fact, this rising market value in Switzerland is accompanied by an increase in (labor) incomes of the top 10 percent and top 1 percent (Figure 4). However,

¹ Note that social security contributions in Switzerland are uncapped and include salaries, bonuses, gratifications, deferred stock options and the like (all valued at pay out). The data further includes all personal income from self-employment.

even after this increase, the income concentration remains lower than in other industrialized countries (see Figure 1).

EXPENDITURE-BASED TAX UNITS AND OTHER SPECIAL CASES

Our top income shares estimates for Switzerland (Foellmi and Martínez 2017a) include expenditure-based and other ‘special cases’ in the tax statistics. An important question is therefore what role these taxpayers play at the top and how their share

among top groups has evolved over time. Switzerland is well-known as an attractive country for high-income residents thanks to its mild tax climate. Especially its expenditure-based tax regime for wealthy foreigners (sometimes referred to as ‘tax deals’ in reference to practices in the area of corporate taxation), has attracted both widespread attention and international critique.

Contrary to common wisdom, expenditure-based taxpayers do not get a special tax deal in the sense that they negotiate over a different tax rate.² The difference is that expenditures (i.e. consumption) replace income as the tax base. Expenditures are mainly based on living expenditures for the taxpayer, the spouse and dependents. The sum of these expenditures has to equal at least five times the (imputed) rent (in case of home-owners). For taxpayers living in hotels, pensions or homes for the elderly, the tax base has to equal at least twice their expenditures for room and board.³ In addition, a control calculation makes sure that the tax is not lower than the regular tax on Swiss income sources would be, namely real estate incomes and all kind of capital incomes, patents and pensions from Swiss sources. Incomes from abroad are further added to the tax base if the taxpayer claims an exemption from foreign income tax that would normally arise on these incomes.

Expenditure-based taxation is available to foreign taxpayers who relocate to Switzerland, under the condition that they do not work in Switzerland. It not only decreases the tax burden but also reduces the costs associated with tax filing. If income streams are a complex mix of different sources from different countries, opting for an expenditure-based tax deal

² It is necessary to apply and obtain a tax ruling from the local tax administration, who considers each case on an individual basis. This may explain the confusion.

³ The rules have become stricter as of 1 January 2016: seven times (imputed) rent or three times the expenditures for accommodation and board, respectively. In addition, a minimum tax base was introduced at the federal (400,000 CHF) and cantonal (varying) levels.

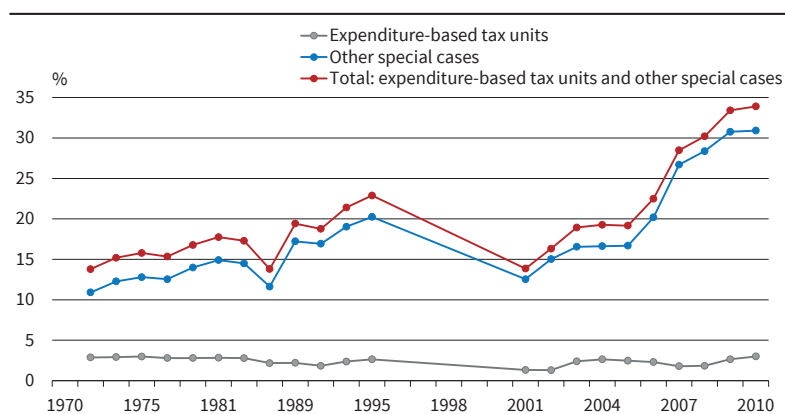
may be less costly, and it guards the taxpayer from falling under suspicion of tax fraud in other countries, since they legally pay their taxes in Switzerland (Weibel 2014). Note that expenditure-based taxation is not available in all cantons. The first to offer these preferential tax treatments for foreigners were Vaud (1862) and Geneva (1928). Over the 20th century, the other cantons followed. Since 2009, five out of the 26 cantons – including Zurich – revoked their expenditure-based taxation.

Although on average we expect these taxpayers' income to be larger than their reported tax base, there is at least some anecdotal evidence that expenditure-based taxpayers sometimes pay more taxes than they would on a regular basis. When the canton of Zurich abolished the expenditure-based taxation in 2010, about half of the 201 expenditure-based taxpayers left the canton, and among those who stayed, only 47 (i.e. approximately 50 percent) paid higher taxes (Finanzdirektion Kanton Zürich 2012).

It turns out, that over the period 1971-2010 a very stable fraction of about 3 percent of the top 0.1 percent were taxed based on expenditures (Figure 5). A much more important and increasing category at the very top are the so-called special cases. These are tax units with taxable income below rate-determining income. They have incomes which were already taxed abroad (e.g. foreign real estate), or they are not subject to taxation in Switzerland for the entire fiscal year (e.g. tax units who emigrate). This allows a distinction to be made of taxpayers who generate income abroad, a particular feature of the Swiss tax data. In these cases, the Swiss tax rate is calculated upon the whole income but is only applied to the income taxable in Switzerland. Again we cannot know by how much the statistics underestimate true income, but it is possible to report these cases.

As can be seen from Figure 5, special cases with global incomes are much more relevant within the top income groups than wealthy foreigners taxed according to their expenditures, and their share has been increasing since the 1970s. Not surprisingly, the share of special cases increases towards the top of the income distribution. This fact entails two interesting findings. First, top income earners in Switzerland are more prone to have incomes from abroad than the average taxpayer, a finding that becomes more accentuated towards the very top of the income distribution. Furthermore, the share of individuals earning income abroad has increased substantially over time, notably among very top groups. While in the 1970s around 12 percent of the top 0.1 percent income

Figure 5
Expenditure-based Tax Units and Special Cases among Top 0.1%



Note: Other special cases have direct income sources from abroad, hence they are an indication of how international the top 0.1 percent of taxpayers are.

Source: Foellmi and Martínez (2017a).

© ifo Institute

earners were special cases, by 2010 this share had increased to 34 percent. In our view, this goes hand-in-hand with the observation that while Switzerland has a relatively equal wage distribution, inequality at the top resembles more the Anglo-Saxon countries. The very top income earners in Switzerland belong to a class of fortunate global citizens: they seem to be able to take advantage of globalization more than the average, and their income process follows the corresponding worldwide trends for top incomes. Second, the presence of tax deals does not play a central role for a possible downward bias of top income shares. Very rich persons with income sources from abroad seem to find attractive tax conditions in Switzerland even without a special tax deal. For our overall results, these findings indicate that our estimates on the evolution of top income shares should be taken as a lower bound and that the bias arising from special cases with several international income sources becomes larger over time and for groups at the very top.

MOBILITY AMONG TOP EARNERS

Top income shares have become a widespread inequality measure, yet they remain cross-sectional snapshots. They say little about the persistence of top earners at the top or changes in lifetime inequality. If the likelihood to drop out of the top 1 percent has increased as well, lifetime inequality may not have changed that much after all. Earlier studies on top income mobility in the United States have found that transitions in and out of the top 1 percent are relatively high (Kopczuk, Saez and Song 2010; Auten, Gee and Turner 2013; Guvenen, Kaplan and Song 2014). Thanks to the panel nature of social security data, it is possible to document the persistence of top earners at the top of the labor income distribution (Martínez 2018).⁴

⁴ This analysis covers only incomes from labour and self-employment, while tax data covers all income sources. Swiss tax data has only a limited panel dimension and mobility cannot be studied

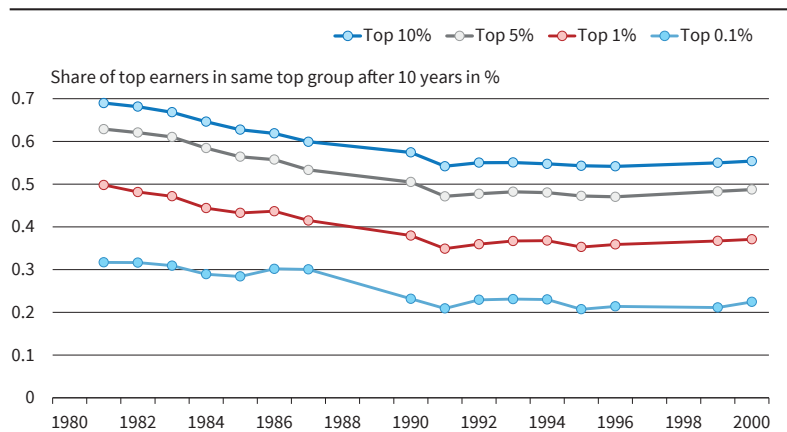
Of those belonging to the top 1 percent in 2009, 77 percent were still in the same percentile one year later. This persistence rate is slightly lower than it was in 1981, when still 81 percent of those in the top 1 percent kept their position after one year. While there clearly is movement in and out of the top 1 percent group over time, after 5 (10) years still around 60 percent (40 percent) of the members are found in that group again (unconditional on being at the top throughout the whole time span though). After 15 years, a third of a working life, 25 percent still make it into that group. Conditional on being a member of the top 1 percent throughout the entire time span, persistence rates are only about 10 percentage points lower. This suggests that many of those observed again at the top a few years later were there throughout the whole time. As one moves further to the top, persistence rates decrease. For the top 0.1 percent, the probability of being at the top again in 5 years was 50 percent. Figure 6 summarizes the (unconditional) persistence rates for different top groups over a time span of 10 years. Over time, the persistence rates of all top groups have been decreasing, and therefore mobility at the top did increase. However, this increase in mobility happened in the 1980s and early 1990s. Since the mid-1990s, when we see top incomes rising, mobility has remained constant. Income mobility could therefore not counteract the rise in income inequality. This is why overall inequality, measured by the Gini index, as well as top income shares rose also in permanent incomes (measured as five-year centered averages).

Figure 8 shows the share in top labor incomes going to the top 1 percent when measured in annual or permanent incomes. Clearly, both series start increasing in the mid-1990s. The spikes in annual incomes in the graph further show that top income shares have a non-negligible transitory component. These transitory incomes make up 5–10 percent of the income share going to the top 1 percent and are highest right before the economy enters a recession. Systematic analyses of the cyclicity and earnings risks in the United States have shown that labor incomes of

Continued Footnote 4:

over long time spans and with as much detail as with social security data. As the literature on top income shares for many countries including Switzerland has found a rising share of income coming from labour even at the very top (Foellmi and Martínez 2017a; Piketty and Saez 2007), the analysis is still meaningful for total income mobility.

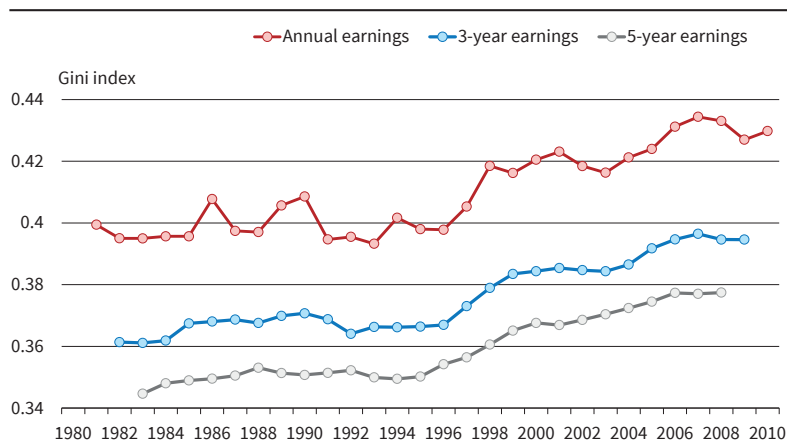
Figure 6
Persistence of Top Income Earners over a Period of Ten Years in Switzerland



Calculations are based on social security data.
Source: Martínez (2018).

© ifo Institute

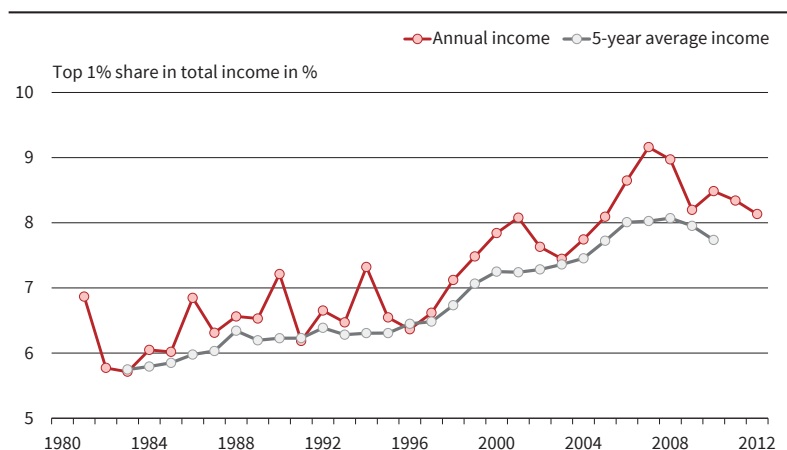
Figure 7
Top Labour Income Shares in Annual and Permanent Income



Source: Martínez (2018).

© ifo Institute

Figure 8
Top Labour Income Shares in Annual and Permanent Income



Source: Martínez (2018).

© ifo Institute

the top 1 percent are more cyclical and are subject to larger earnings risks than those of the rest of the population (Guvenen, Kaplan and Song 2014; Guvenen, Ozkan and Song, 2014; Guvenen *et al.* 2017).

WEALTH INEQUALITY

Economic inequality affects not only income but also wealth – and in all countries with available data, wealth is more unequally distributed than income. This is not surprising, since wealth accumulates through savings, whose rates are increasing in income. Figure 9 shows that Switzerland’s wealth concentration is among the highest in the world, with the richest 1 percent accounting for around 40 percent of total assets – about twice as much as France and England (see OECD Wealth Distribution Statistics). This is surprising, given the balanced income distribution in Switzerland. One reason is the attractiveness of Switzerland for top earners and multinational companies, which is reflected in the high shares of the top 0.1 and top 0.01 percent of the income distribution. This manifests itself in very high asset shares of these internationally successful individuals. However, Figure 9 also shows impressively the continuing political stability of Switzerland. Fortunes are a much longer-term indicator than income because they are accumulated over several decades through savings and capital gains. The absence of wars and the associated economic policy changes never let the top 1 percent share break down over an entire century – in contrast to the comparison states.

In Foellmi and Martínez (2017a), however, we qualify this extreme concentration. The available assets are based on tax statistics, which do not take into account the tax-exempt assets in pension funds. By contrast, the ranks of the other countries in Figure 9 also include pension assets (with the exception of future pension promises of state pension schemes such as Swiss AHV). If we consider this fact,

the top 1 percent’s wealth share in 2011 falls from 40 percent to around 27 percent.

CONCLUSION

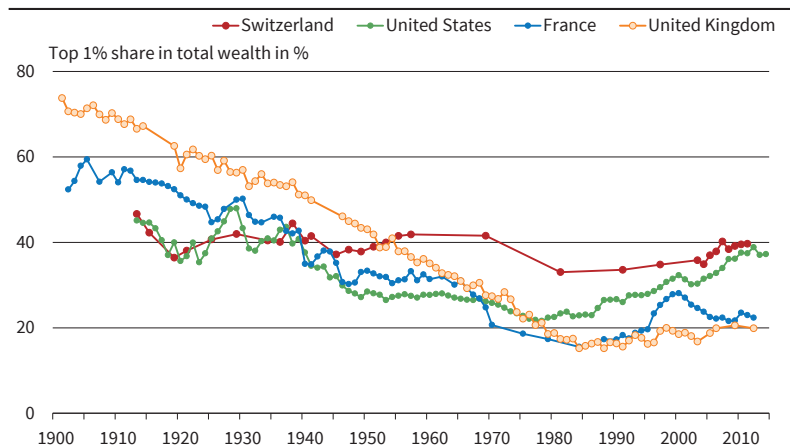
Although income inequality and top income have repeatedly led to lively discussions around distribution issues, Switzerland is a haven of stability in terms of income inequality for the general population, especially in international terms. The present article also shows that Switzerland, with its well-functioning dual education system and its associated high level of labor market participation, succeeded in achieving relatively high and balanced income for broad sections of the population compared to other industrialized countries. However, income inequality of market incomes has increased, measured by top income shares and by the Gini index of gross incomes, as well. This increase in inequality is mainly due to the increase in top income since the 1990s. The latter was driven by an increase among the very top, where Switzerland resembles the path of Anglo-Saxon countries. This mirrors our result that the very top income earners in Switzerland have become more globalized, and they seem to be able to reap the fruits of globalization more than the average. We did not analyze whether the increase in primary income inequality leads to higher inequality in disposable incomes. As discussed in Foellmi and Martínez (2017b), the distribution of net income when measured by surveys has remained constant, so the increase in inequality has been largely offset by increased redistribution.

To assess changes in lifetime rather than annual inequality, mobility patterns have to be taken into account. Martínez (2018) provides evidence that indeed income mobility at the top is higher than it was in the 1980s. However, the increase in mobility happened mainly in the 1980s. The years since the mid-1990s that saw an increase in top income inequality was not accompanied by higher mobility. Overall,

when measuring permanent incomes, the increase in mobility was not sufficient to offset the increase in inequality.

The absence of wars, the long-term stability of Switzerland and its strong federal structure with tax competition have never led to abrupt changes in economic policy, as evidenced by the extremely stable currency. All of these factors led to a very persistent distribution of assets over time in international comparison. The degree of wealth inequality is very high: the richest 1 percent of taxpayers owns

Figure 9
Wealth Share of Top 1% in International Comparison
1900–2015



Source: Wid.world; Foellmi and Martínez (2017a).

© ifo Institute

about 40 percent of all taxable assets. However, it is important to relativize this number. On the one hand, part of the high wealth inequality lies in Switzerland's long-standing attractiveness for the very affluent. On the other hand, and as we show in Foellmi and Martínez (2017a), concentration clearly falls when the tax-exempted assets from the Pension Fund and the voluntary 'Pillar 3a' pension plans are taken into account. The richest percent still owns just over 25 percent of wealth, which would put Switzerland in the international comparison of top wealth shares in the midfield of asset concentration.

REFERENCES

- Atkinson, A.B. and T. Piketty (2007), *Top Incomes over the Twentieth Century: A Contrast between Continental European and English-Speaking Countries*, Oxford: Oxford University Press.
- Atkinson, A.B. and T. Piketty (2010), *Top Incomes: A Global Perspective*, Oxford: Oxford University Press.
- Auten, G., G. Gee and N. Turner (2013a), "Income Inequality, Mobility, and Turnover at the Top in the US, 1987–2010", *American Economic Review* 103, 168–172.
- Auten, G., G. Gee and N. Turner (2013b), "New Perspectives on Income Mobility and Inequality", *National Tax Journal* 66, 893–912.
- Bertrand, M. and S. Mullainathan (2001), "Are CEOs Rewarded for Luck? The Ones without Principals Are", *The Quarterly Journal of Economics* 116, 901–932.
- Finanzdirektion Kanton Zürich (2012), "Einkommenssteuerbelastung jetzt spürbar über dem schweizerischen Mittel", Press Release, 16 March.
- Foellmi, R. and I.Z. Martínez (2017a), "Volatile Top Income Shares in Switzerland? Reassessing the Evolution between 1981 and 2010", *The Review of Economics and Statistics* 99, 793–809.
- Foellmi, R. and I.Z. Martínez (2017b), *Die Verteilung von Einkommen und Vermögen in der Schweiz*, UBS International Center of Economics in Society Public Paper 6.
- Gabaix, X. and A. Landier (2008), "Why Has CEO Pay Increased So Much?", *The Quarterly Journal of Economics* 123, 49–100.
- Gilens, M. and B. Page (2014), "Testing Theories of American Politics: Elites, Interest Groups, and Average Citizens", *Perspective on Politics* 12, 564–581.
- Guvenen, F., G. Kaplan, G. and J. Song (2014), "How Risky Are Recessions for Top Earners?", *American Economic Review* 104, 148–153.
- Guvenen, F., S. Ozkan and J. Song (2014), "The Nature of Countercyclical Income Risk", *Journal of Political Economy* 122, 621–660.
- Guvenen, F., F. Karahan, S. Ozkan and J. Song (2017), "Heterogeneous Scarring Effects of Full-Year Nonemployment", *American Economic Review* 107, 369–373.
- Kopczuk, W., E. Saez and J. Song (2010), "Earnings Inequality and Mobility in the United States: Evidence from Social Security Data since 1937", *The Quarterly Journal of Economics* 125, 91–128.
- Martínez, I.Z. (2018), *Who Is a Top Earner and for How Long? Top Income Mobility in Switzerland*, mimeo.
- Piketty, T. and E. Saez (2007), "Income and Wage Inequality in the United States 1913–2002", in: Atkinson, A.B. and T. Piketty (eds.), *Top Incomes over the Twentieth Century: A Contrast between Continental European and English-Speaking Countries*, Oxford: Oxford University Press.
- Piketty, T. (2014), *Capital in the Twenty-First Century*, Cambridge MA: Harvard University Press.
- Weibel, J. (2014), "Pauschalsteuer: Der Himmel auf Erden", *Die Zeit*, 25 September.

Paul Hufe and Andreas Peichl Inequality and Unfairness in Europe



Paul Hufe
ifo Institute



Andreas Peichl
ifo Institute

INTRODUCTION

Economic inequality has become one of the most prominent topics in public discourse among academics, policymakers and the general public. Typically, these debates are informed by longitudinal or cross-country comparisons with respect to some aggregate measure of economic inequality. For example, in recent academic and policy contributions the authors from the World Inequality (Piketty *et al.* 2018; Alvaredo *et al.* 2018) raise red flags with respect to the current development of inequality by drawing on long-term comparisons both within and between countries using top (income/wealth) shares as measures of inequality.

Such comparisons are important in their own right. Yet, they are less informative when it comes to the question of distributive justice. In many of these contributions the underlying normative assumption seems to be that less inequality is always better than more. Taking this presumption to its logical conclusion, the ideal point of income distribution is perfect equality. Perfect equality, however, seems almost indefensible both from an efficiency and from a moral perspective. To be sure, there are many potential reasons why inequality is not morally justifiable. However, there are also many reasons why some inequality may be defensible. All else equal, would we really want to redistribute from A to B if all their income difference is due to the fact that A works long hours, while B decides to prefer leisure over work? If not, it is clear that perfect equality is a misleading reference point when discussing the fairness of a given income distribution.

While hidden normative assumptions abound in public discourse on inequality, an explicit discussion of what it means to live in a society with a fair distribution of income is glaringly absent. Is the current income distribution of Denmark fairer than that of Germany? Have the United States become more unfair since the golden age of the welfare state in the aftermath of World War II? Such questions cannot be answered by merely comparing aggregate inequality measures such as the Gini coefficient. Instead – we argue in this paper – it is more useful to put the question of why we think that inequality is unfair first. Endowed with an explicit normative conception, it is then possible to

evaluate the income distributions from a fairness perspective.

In this paper, we consider three aspects of inequality that could provoke normative concern. Specifically, we will calculate summary statistics for each of these concerns and analyse the extent to which they are reflected in a standard measure of inequality: the Gini index.¹

Firstly, we consider individual deprivation, i.e. the concern that some do not have sufficient means to make ends meet (Lipton and Ravallion 1995). Typically, poverty is calculated by partitioning the population into a poor and a non-poor fraction by means of a poverty line. An aggregation index is then applied to summarize the income distribution below the poverty line (Sen 1976; Foster *et al.* 1984). The higher the poverty index, the unfairer the income distribution from the perspective of those who are poverty-averse.

Secondly, we consider individual affluence, i.e. the concern that some have so much that they could tilt the balance of social processes in their favour (Piketty 2014). In analogy to poverty measurement the population is partitioned into an affluent and a non-affluent fraction by means of a richness threshold. Then an aggregation index is applied to summarize the income distribution above the richness line (Peichl *et al.* 2010). The higher the richness index, the unfairer the income distribution from the perspective of those who are affluence-averse.

Thirdly, equality of opportunity, i.e. the concern that disparities among individuals are due to factors for which they should not be held responsible (Roemer and Trannoy 2015). Typically, inequality of opportunity is measured by comparing incomes across types that are defined by a set of factors beyond individual control (Cecchi and Peragine 2010; Hufe *et al.* 2017). The larger the disparities across types, the more individual incomes are determined by factors beyond individual control, the unfairer the income distribution from the perspective of an opportunity-egalitarian.

DATA

To illustrate the suggested aspects of unfairness, we draw on the EU Statistics on Income and Living Conditions (EU-SILC), which cover 31 European countries.² EU-SILC is a well-researched database for monitoring inequality, poverty and social exclusion in Europe (see e.g. Atkinson *et al.* (2017) and the

¹ Naturally this analysis could be conducted using any prevalent measure of inequality. Yet it is well known that inequality measures are highly correlated – see Leigh (2007) for a comparison of top income share measures with the Gini coefficient. Therefore, our main conclusions will hardly be affected.

² This section is a modified version of the data description in Hufe *et al.* (2018). The sample consists of Austria (AT), Belgium (BE), Bulgaria (BG), Switzerland (CH), Cyprus (CY), Czech Republic (CZ), Germany (DE), Denmark (DK), Estonia (EE), Greece (EL), Spain (ES), Finland (FI), France (FR), Croatia (HR), Hungary (HU), Ireland (IE), Iceland (IS), Italy (IT), Malta (MT), Lithuania (LT), Luxembourg (LU), Latvia (LV), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovenia (SI), Slovakia (SK), and Britain (UK).

references cited therein), which makes it easy to compare our results with previous works. In particular, we use the 2011 wave as it provides a module on the intergenerational transmission of advantages, which allows us to construct types from circumstance variables.³ As is common in survey data, incomes are reported for the year preceding the survey, i.e. 2010 in our case.

We follow standard practices from the literature branches on inequality and poverty measurement in setting up the data. We focus on disposable household income adjusted by the OECD-equivalence scale as the outcome of interest. This is standard in poverty measurement, since the notion of deprivation typically refers to individual well-being as approximated by consumption possibilities. The few observations with incomes below zero are excluded from the analysis. We replace zero incomes by one to avoid sample reductions through logarithmic transformations. To curb the influence of outliers in the lower and the upper part of the income distribution, we winsorize at the 1st and the 99.95th-percentile of the country-specific income distribution. Furthermore, we restrict the sample to working-aged individuals of 25–59 years. To assure the representativeness of the sample, all calculations are performed considering personal cross-sectional sample weights.

The measurement of poverty and affluence is highly contingent on the specification of the poverty and the richness line. Here we hold the poverty line y_{min} fixed at the so-called European *At-Risk-Of-Poverty Rate* which is drawn at 60-percent of the country-specific median equivalized disposable household income. To be categorized as affluent, households must dispose of at least 400 percent of

Table 1
Descriptive Statistics

Country	No.	Mean	Med.	Pov. line	Rich. line	Types
AT	6,350	25,590	22,033	13,220	88,133	36
BE	5,407	24,131	20,063	12,038	80,251	35
BG	6,931	3,798	2,939	1,763	11,756	30
CH	6,897	42,253	34,691	20,815	138,764	36
CY	4,906	21,152	17,002	10,201	68,007	36
CZ	6,752	9,040	7,528	4,517	30,113	29
DE	12,316	22,398	18,980	11,388	75,922	36
DK	2,532	30,803	26,306	15,784	105,225	32
EE	5,374	7,178	5,514	3,309	22,058	36
EL	6,331	13,458	10,840	6,504	43,360	35
ES	15,360	17,359	14,160	8,496	56,641	36
FI	4,563	25,966	22,001	13,201	88,004	36
FR	11,145	24,583	20,550	12,330	82,200	36
HR	5,947	6,722	5,602	3,361	22,408	36
HU	13,583	5,397	4,617	2,770	18,469	31
IE	3,069	25,386	20,151	12,090	80,603	36
IS	1,579	20,616	19,398	11,639	77,592	34
IT	20,152	18,985	16,307	9,784	65,228	36
LT	5,295	4,810	3,874	2,325	15,497	34
LU	6,871	38,257	33,336	20,002	133,344	36
LV	6,437	5,457	4,183	2,510	16,733	36
MT	4,255	13,416	11,134	6,680	44,535	36
NL	5,513	24,024	20,708	12,425	82,834	36
NO	2,493	40,730	36,869	22,122	147,477	36
PL	1,4616	6,233	5,081	3,048	20,323	23
PT	5,923	11,037	8,558	5,135	34,231	33
RO	7,565	2,575	2,180	1,308	8,720	23
SE	5,75	24,500	22,706	13,624	90,824	30
SI	4,870	13,127	12,037	7,222	48,147	36
SK	7,288	7,494	6,392	3,835	25,569	32
UK	6,242	23,323	17,561	10,537	70,246	36

Note: All statistics refer to the equivalized disposable household income. The poverty line is calculated as 60% of the median income. The richness line is calculated as 400% of the median income.

Source: EU-SILC 2011 cross-sectional (rev. 5 June 2015).

the country-specific median equivalized disposable household income.

For the estimation of inequality of opportunity it is indispensable to divide the population into types. In this paper we use four circumstance variables that are frequently utilized in the empirical literature on equality of opportunity. The first circumstance is the biological sex of the respondent. Secondly, we proxy the respondent's migration background by a binary indicator for whether the respondent lived in her country of birth at time of survey completion. Thirdly, we use information on the educational status of the parents. More specifically, we construct types based on whether the highest educated parent of a respondent dropped out of secondary education, attained a secondary school degree, or whether the highest educated parent of a respondent completed at least some tertiary education. Lastly, we proxy

³ The 2005 wave also comprises a module on the intergenerational transmission of advantages for a sample of 26 European countries. Results for the 2005 wave are available on request.

the occupational status of both parents by grouping them into either elementary occupations, semi-skilled occupations, or top-rank positions. We only retain information on the parent with the highest occupational status. As such, each of the considered populations is partitioned into a maximum of $2 \times 2 \times 3 = 36$ non-overlapping circumstance types. As illustrated in Table 1 some country observations fall short of 36 types. This is due to the fact that some combinations of circumstances are extremely rare in the data. To give an intuitive example, the combination of the highest educated parent having less than a secondary school degree, but occupying a top-rank position in her profession is extremely rare. In order to curb the influence of very small types, we only retain those types for which we have a minimum of 20 observations in the respective country cell.

Table 1 shows descriptive statistics for the income distributions in our country sample. In 2010 mean disposable household income was lowest in Romania, Bulgaria and Lithuania ($\mu < \text{EUR } 5,000$). At the top of the intra-European country distribution we find Luxembourg, Norway and Switzerland, with average disposable household incomes hovering around the EUR 40,000 mark. In all countries in our sample income distributions are skewed to the right, i.e. the median income lies below the country average. In general, there are very few re-rankings when comparing countries based on the median instead of the mean. The leading countries are again Luxembourg, Norway and Switzerland, which are the only countries with median incomes above EUR 30,000 in 2010. At the lower end, we again find Romania, Bulgaria and Lithuania with median incomes of below EUR 4,000.

RESULTS

Inequality

To gain a first understanding of inequality in Europe, we calculate different inequality measures, all of which put particular emphases on different parts of the income distribution (Table 2). The Gini index is one of the most widely used inequality measure both in academia and public discourse. It is particularly sensitive to transfers in the middle of the income distribution. In addition to the Gini, we provide three inequality measures of the generalized entropy class (Cowell 2016). This class of measures is given by

$$(1) \quad I(Y) = \frac{1}{\alpha[\alpha-1]} \left[\frac{1}{N} \sum_i \left(\frac{y_i}{\mu} \right)^\alpha - 1 \right]$$

where α is a parameter governing inequality aversion at different positions in the income distribution. In general, the lower α , the higher the concern for incomes at the lower end of the income distribution. We choose three different parameterizations of α . With $\alpha = 0$ we obtain the mean log deviation (MLD) which is particularly sensitive to

transfers at the lower end of the income distribution. With $\alpha = 1$ we obtain the Theil index (Theil) and with $\alpha = 2$ the coefficient of variation (CV) – both of which increasingly shift their normative focus from the lower parts of the income distribution to the upper parts.

Despite their different foci, all of the inequality indices yield remarkably stable country rankings. This is reflected in rank correlations of above 0.80 for all inequality measures under consideration. However, there are some notable re-rankings. Sweden, for example, is the country with the second lowest inequality as measured by the Gini. However, it falls back to 17th position when summarizing the income distribution by the MLD index. Similarly, Denmark falls back from position 9 to position 16. This suggests that in both of these countries inequality is mainly driven by households that dispose of considerably less income than the population mean. France, by contrast, falls back from position 18 in the Gini-ranking to position 30 in the CV-ranking. Hence, inequality in France appears to be more strongly driven by high-income households pulling away from the population mean. According to all measures except for the CV (Rank 2) Norway is the most equal society within our sample.

Unfair Inequality

As outlined in the first section, claims for full equality are hard to substantiate. As a result, comparisons based on inequality measures can be misleading when it comes to the evaluation of income distributions from a fairness perspective. Therefore, we now turn to three different aspects of inequality that could raise normative concern: poverty, affluence and inequality of opportunity. Furthermore, we analyse the extent to which these aspects are correlated with total inequality levels in Europe.

(a) Poverty

To characterise the lower end of income distributions we draw on three measures. The headcount ratio yields the share of households falling short of the poverty line. Hence it is only sensitive to the number of the poor, while it is indifferent to the extent of deprivation faced by these households. The gap ratio measures the average distance of poor households to the poverty line. While it incorporates how severely households are deprived on average, it is indifferent to inequalities among the poor. Both measures belong to the larger Foster-Greer-Thorbecke family of poverty measures (Foster *et al.* 1984). Beyond the number of the poor and their average shortfall from the poverty line, the Watts index (Zheng 1993) additionally varies with inequality among the poor. Hence, *ceteris paribus* it increases with regressive transfer among the poor.

There is some variation in the country rankings based on the different measures of poverty. The headcount ratio in particular yields different

Table 2
Inequality Statistics

Country	Gini	Rank	MLD	Rank	Theil	Rank	CV	Rank
AT	0.270 (0.00)	12	0.127 (0.00)	12	0.127 (0.00)	13	0.154 (0.01)	13
BE	0.243 (0.00)	4	0.102 (0.00)	3	0.103 (0.00)	4	0.124 (0.01)	6
BG	0.332 (0.00)	29	0.200 (0.01)	26	0.195 (0.01)	29	0.253 (0.02)	28
CH	0.279 (0.00)	17	0.133 (0.00)	15	0.144 (0.01)	18	0.206 (0.02)	22
CY	0.277 (0.00)	16	0.129 (0.00)	13	0.134 (0.01)	16	0.171 (0.01)	17
CZ	0.255 (0.00)	8	0.112 (0.00)	7	0.116 (0.00)	8	0.143 (0.01)	9
DE	0.276 (0.00)	15	0.132 (0.00)	14	0.134 (0.00)	15	0.170 (0.01)	16
DK	0.258 (0.01)	9	0.133 (0.01)	16	0.128 (0.01)	14	0.174 (0.03)	18
EE	0.324 (0.00)	24	0.194 (0.01)	24	0.175 (0.01)	22	0.196 (0.01)	19
EL	0.331 (0.01)	26	0.204 (0.01)	28	0.198 (0.01)	30	0.262 (0.02)	29
ES	0.329 (0.00)	25	0.200 (0.00)	27	0.187 (0.01)	25	0.230 (0.01)	24
FI	0.252 (0.00)	7	0.111 (0.00)	6	0.115 (0.01)	7	0.152 (0.02)	11
FR	0.290 (0.00)	18	0.143 (0.00)	18	0.168 (0.01)	20	0.285 (0.03)	30
HR	0.302 (0.00)	20	0.173 (0.00)	20	0.152 (0.00)	19	0.165 (0.01)	15
HU	0.275 (0.00)	14	0.124 (0.00)	11	0.126 (0.00)	12	0.148 (0.00)	10
IE	0.292 (0.01)	19	0.150 (0.01)	19	0.142 (0.01)	17	0.160 (0.01)	14
IS	0.241 (0.01)	3	0.105 (0.01)	4	0.103 (0.01)	5	0.120 (0.01)	4
IT	0.310 (0.00)	21	0.198 (0.00)	25	0.170 (0.00)	21	0.204 (0.01)	20
LT	0.340 (0.01)	30	0.235 (0.01)	31	0.194 (0.01)	28	0.216 (0.01)	23
LU	0.272 (0.00)	13	0.123 (0.00)	10	0.126 (0.01)	11	0.153 (0.01)	12
LV	0.353 (0.00)	31	0.234 (0.00)	30	0.208 (0.00)	31	0.237 (0.01)	25
MT	0.269 (0.00)	11	0.120 (0.00)	8	0.119 (0.00)	10	0.135 (0.01)	8
NL	0.244 (0.00)	5	0.097 (0.00)	2	0.102 (0.00)	2	0.120 (0.01)	5
NO	0.221 (0.01)	1	0.089 (0.00)	1	0.089 (0.01)	1	0.109 (0.01)	2
PL	0.320 (0.00)	23	0.177 (0.00)	22	0.181 (0.01)	23	0.240 (0.01)	26
PT	0.332 (0.01)	28	0.186 (0.01)	23	0.192 (0.01)	27	0.249 (0.01)	27
RO	0.332 (0.00)	27	0.207 (0.00)	29	0.184 (0.00)	24	0.206 (0.01)	21
SE	0.237 (0.01)	2	0.137 (0.02)	17	0.102 (0.01)	3	0.105 (0.02)	1
SI	0.248 (0.00)	6	0.110 (0.00)	5	0.105 (0.00)	6	0.117 (0.01)	3
SK	0.259 (0.00)	10	0.122 (0.00)	9	0.116 (0.00)	9	0.134 (0.01)	7
UK	0.319 (0.01)	22	0.174 (0.01)	21	0.192 (0.01)	26	0.301 (0.04)	31

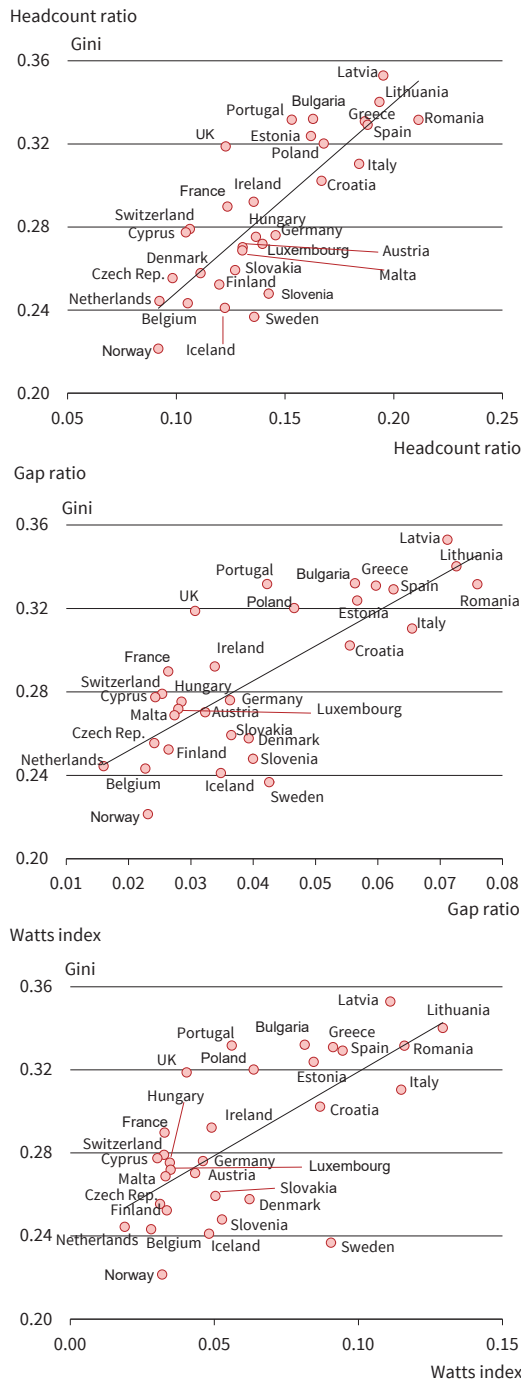
Note: All statistics refer to the equivalized disposable household income. Standard errors are calculated based on a bootstrap procedure with 500 draws and reported in parentheses.

Source: EU-SILC 2011 cross-sectional (rev. 5 June 2015).

conclusions than the remaining two measures. While the latter have a rank correlation of above 0.98, the analogous coefficients for the former hover around the 0.90 mark. For example, Denmark and Iceland rank 7 and 9 with respect to the headcount ratio. However, they fall back to ranks 18 and 15 in terms of the poverty gap. This suggests that in these countries poverty is not very pervasive, but on average relatively severe for those who actually fall below the deprivation threshold. The reverse holds true for Hungary and Luxembourg, which improve from ranks 17 and 18 to ranks 11 and 10 when the headcount ratio is replaced by the gap ratio. Hence, in these countries there is a relatively high number deprived households that, on average, are very close to the deprivation threshold. In line with the high rank correlation of the poverty gap ratio and the Watts index, there are only moderate re-rankings when comparing these measures.

As illustrated in Figure 1 all of the considered poverty measures are positively correlated with total inequality as measured by the Gini index. Yet, the positive correlation hides a more nuanced picture. Consider the cases of Britain (UK) and Poland (PL). With a Gini index of approximately 0.320, both are on par in terms of aggregate inequality. Does this imply that both countries also are on par from a fairness perspective? This is definitely not the case if fairness accommodates poverty aversion. According to all considered measures, poverty levels in Poland far exceed their British counterparts. Hence, evaluating the income distribution of those

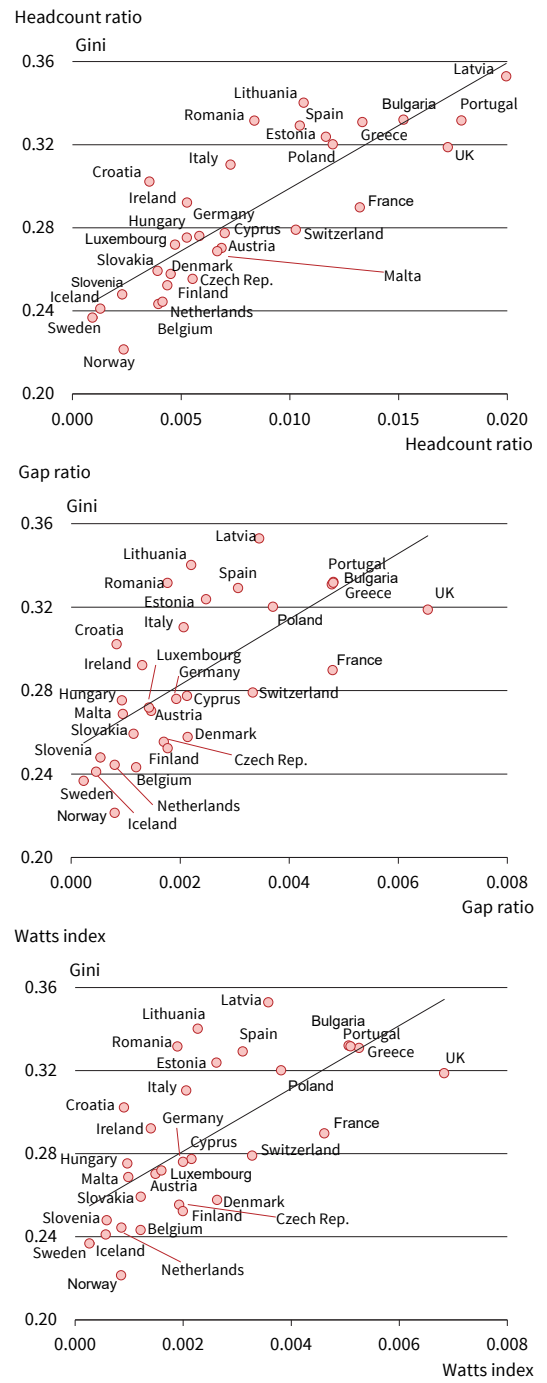
Figure 1
Inequality and Poverty



Note: The Pearson correlation coefficients are based on the Gini coefficient and the respective poverty measure. The correlation coefficient of inequality with headcount ratio, gap ratio and Watts index are 0.819, 0.773, 0.686. Point estimates and standard errors are presented in Table A1. Source: EU-SILC (2011) cross-sectional (rev. 5 June 2015).

two countries with reference to aggregate inequality may be grossly misleading if we maintain that inequality is very worrying insofar as the poor do not have enough income to make ends meet. Of course, poverty may not be the only reason of why we care about income disparities. Hence, we now turn to the case of affluence.

Figure 2
Inequality and Affluence



Note: The Pearson correlation coefficients are based on the Gini coefficient and the respective affluence measure. The correlation coefficient of inequality with headcount ratio, gap ratio and Watts index are 0.836, 0.676, 0.678. Point estimates and standard errors are presented in Table A1. Source: EU-SILC (2011) cross-sectional (rev. 5 June 2015).

(b) Affluence

To characterise the upper end of the income distributions we draw on three measures that are reminiscent of the poverty measures characterised in the previous paragraph. The headcount ratio yields the share of households exceeding the richness line.

Like its poverty counterpart, it is only sensitive to the number of affluent individuals in a given population. The gap ratio measures the average share of income exceeding the richness lines for those who fall into the affluent group. While it incorporates how affluent households are on average, it is indifferent to inequalities among the rich. Lastly, we calculate the Watts index of affluence that weights incomes above the richness lines by means of a logarithmic transformation.⁴

Again, rank correlations across the different measures are sizable and consistently above 0.90. Nevertheless, we obtain some notable re-rankings, especially when moving from the headcount ratio to the remaining two measures. Finland, for example, falls back from rank 9 in terms of the affluence headcount to rank 16 in terms of the gap ratio and the Watts index. Malta, by contrast, climbs from rank 16 to rank 8. Hence, in Finland there are relatively few rich people, but their average affluence is fairly high. In Malta, on the contrary, there appears to be a relatively large number of affluent households with incomes fairly close to the richness threshold.

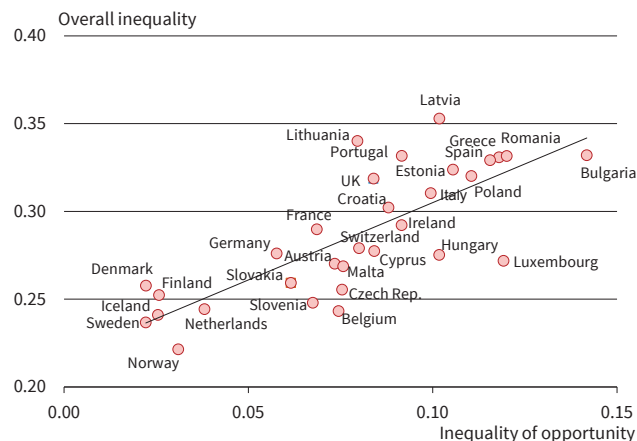
In analogy to the poverty measures, all of the considered richness measures are positively correlated with total inequality as measured by the Gini index (Figure 2). Nevertheless, it is important to register the nuanced differences in the inequality experiences of the different countries to draw conclusions with respect to fairness. Consider again the cases of Britain (UK) and Poland (PL) which are comparable in overall inequality. In contrast to the comparison based on poverty, it is now Britain which is characterised by far more unfairness in income distribution, since affluence measures in this country far exceed their Polish counterparts. Hence, measured by poverty-aversion we should prefer the income distribution of Britain over that of Poland, affluence-aversion leads to the opposite conclusion.

(c) Inequality of Opportunity

In a last step we address concern over unequal opportunities. For the sake of this exposition we

⁴ Due to the logarithmic transformation the index is particularly sensitive in the income range just above the richness threshold. As a consequence the richness index may decrease through regressive transfers in the affluent partition of the population. In spite of this crude property we retain the Watts index of affluence for comparative purposes with its analogous measure of poverty. For a more thorough discussion of concave and convex affluence indices, see Peichl *et al.* (2010).

Figure 3
Inequality and Inequality of Opportunity
Measured in terms of Gini coefficients



Note: The Pearson correlation coefficients are based on the Gini coefficient and the inequality of opportunity measure. The correlation coefficients of inequality with inequality of opportunity is 0.771. Point estimates and standard errors are presented in Table A1.

Source: EU-SILC 2011 cross-sectional (rev. 5 June 2015).

© ifo Institute

measure inequality of opportunity by means of the *ex-ante* utilitarian methodology (Van de gaer and Ramos 2016), in which we first replace the incomes of individuals by the mean income of their respective type. In a second step we characterise inequality in this counterfactual distribution by the Gini index. This measure follows the following logic: the larger the average disparities due to factors beyond individual control, the larger the disparities in circumstance type means, the larger the Gini index in the counterfactual distribution and hence the larger the measure of inequality of opportunity.

The correlation between inequality of opportunity and overall inequality is shown in Figure 3. As in the previous cases, overall inequality is positively correlated with concern over equal opportunities. However, this is not to say that opportunity egalitarians can make fairness judgements based on the comparison of overall inequality alone. For example, despite their comparability in overall inequality, Poland and Britain are strongly diverging in terms of the distribution of opportunities. While inequality of opportunity reaches a level of 0.084 Gini points in Britain (Rank 17), inequality of opportunity amounts to 0.110 Gini points (Rank 27) in Poland. Hence an opportunity egalitarian would prefer the income distribution of Britain over the one in Poland.

CONCLUSION

This article shows that aggregate measures of inequality are imperfect proxies of fairness in a given distribution of income. While inequality correlates positively with poverty, affluence and inequality of opportunity, the correlation is far from perfect, leading to different country rankings depending on the normative principle chosen. For fairness

considerations, it is thus indispensable to have a clear understanding of why we care about inequality.

Current research on fairness preferences suggests that fairness cannot be captured by referring to one normative principle alone (Konow 2003; Konow and Schwettmann 2016). Instead, it appears that fairness preferences are informed by multiple normative principles – like freedom from poverty, freedom from affluence and equality of opportunity. Our analysis shows that the isolated analysis of these aspects may point in different directions when comparing income distributions. It is not necessarily the case that less poverty goes hand in hand with less affluence and a more equal distribution of opportunities. Therefore empirical researchers interested in the question of fairness need to find ways to reconcile different normative concerns into aggregate measures of unfair inequality. A first contribution to this research agenda can be found in Hufe *et al.* (2018).

Zheng, B. (1993), “An Axiomatic Characterization of the Watts Poverty Index”, *Economics Letters* 42, 81–86.

APPENDIX: DETAILED RESULTS OVERVIEW

REFERENCES

- Alvaredo, F., L. Chancel, T. Piketty, E. Saez, and G. Zucman (2018), *World Inequality Report*, Paris: World Inequality Lab.
- Atkinson, A.B., A.C. Guio and E. Marlier (eds., 2017), *Monitoring Social Exclusion in Europe: 2017 Edition*, Luxembourg: Publications Office of the European Union.
- Cecchi, D. and V. Peragine (2010), “Inequality of Opportunity in Italy”, *The Journal of Economic Inequality* 8, 429–450.
- Cowell, F.A. (2016), “Inequality and Poverty Measures”, in: Adler, M.D. and M. Fleurbaey (eds.), *Oxford Handbook of Well-Being and Public Policy*, Oxford: Oxford University Press, 82–125.
- Foster, J., J. Greer and E. Thorbecke (1984), “A Class of Decomposable Poverty Measures”, *Econometrica* 52, 761–766.
- Hufe, P., A. Peichl, J.E. Roemer and M. Ungerer (2017), “Inequality of Income Acquisition: The Role of Childhood Circumstances”, *Social Choice and Welfare* 143, 499–544.
- Hufe, P., R. Kanbur and A. Peichl (2018), *Measuring Unfair Inequality: Reconciling Equality of Opportunity and Freedom from Poverty*, mimeo.
- Konow, J. (2003). “Which Is the Fairest One of All? A Positive Analysis of Justice Theories”, *Journal of Economic Literature* 41, 1188–1239.
- Konow, J. and L. Schwettmann (2016), “The Economics of Justice”, in: Sabbagh, C. and M. Schmitt (eds.), *Handbook of Social Justice Theory and Research*, New York: Springer, 83–106.
- Leigh, A. (2007), “How Closely Do Top Income Shares Track Other Measures of Inequality?”, *The Economic Journal* 117, F619–F633.
- Lipton, M. and M. Ravallion (1995), “Poverty and Policy”, in: Behrman, J. and T. Srinivasan (eds.), *Handbook of Development Economics* 3B, Amsterdam: Elsevier, 2551–2657.
- Peichl, A., T. Schaefer and C. Scheicher (2010), “Measuring Richness and Poverty: A Micro Data Application to Europe and Germany”, *Review of Income and Wealth* 56, 597–619.
- Piketty, T. (2014), *Capital in the Twenty-First Century*, Cambridge MA: The Belknap Press of Harvard University Press.
- Piketty, T., E. Saez and G. Zucman (2018), “Distributional National Accounts: Methods and Estimates for the United States”, *The Quarterly Journal of Economics*, forthcoming.
- Roemer, J.E. and A. Trannoy (2015), “Equality of Opportunity”, in: Atkinson, A.B. and F. Bourguignon (eds.), *Handbook of Income Distribution* 2B, Amsterdam: Elsevier, 217–300.
- Sen, A. (1976), “Poverty: An Ordinal Approach to Measurement”, *Econometrica* 44, 219–231.
- Van de gaer, D. and X. Ramos (2016), “Empirical Approaches to Inequality of Opportunity: Principles, Measures, and Evidence”, *Journal of Economic Surveys* 30, 855–883.

Table A1
Estimates by Country

Country	Gini (inequality)	Rank	Headcount (poverty)	Rank	Gap ratio (poverty)	Rank	Watts index (poverty)	Rank	Headcount (affluence)	Rank	Gap ratio (affluence)	Rank	Watts index (affluence)	Rank	Gini (inequality of opp.)	Rank
AT	0.270 (0.003)	12	0.131 (0.005)	14	0.032 (0.002)	13	0.043 (0.002)	13	0.007 (0.001)	17	0.001 (0.000)	13	0.001 (0.000)	12	0.073 (0.004)	11
BE	0.243 (0.004)	4	0.105 (0.005)	5	0.023 (0.001)	2	0.028 (0.002)	2	0.004 (0.001)	7	0.001 (0.000)	10	0.001 (0.000)	9	0.074 (0.004)	12
BG	0.332 (0.004)	29	0.163 (0.005)	23	0.056 (0.002)	24	0.081 (0.003)	22	0.015 (0.002)	28	0.005 (0.001)	30	0.005 (0.001)	28	0.142 (0.006)	31
CH	0.279 (0.004)	17	0.106 (0.005)	6	0.025 (0.001)	6	0.033 (0.002)	6	0.010 (0.001)	21	0.003 (0.001)	24	0.003 (0.001)	24	0.080 (0.004)	16
CY	0.277 (0.005)	16	0.104 (0.006)	4	0.024 (0.002)	5	0.030 (0.002)	3	0.007 (0.001)	18	0.002 (0.001)	19	0.002 (0.001)	19	0.084 (0.006)	18
CZ	0.255 (0.004)	8	0.098 (0.004)	3	0.024 (0.001)	4	0.031 (0.002)	4	0.006 (0.001)	14	0.002 (0.000)	14	0.002 (0.000)	15	0.075 (0.004)	13
DE	0.276 (0.003)	15	0.146 (0.004)	20	0.036 (0.001)	16	0.046 (0.002)	14	0.006 (0.001)	15	0.002 (0.000)	17	0.002 (0.000)	17	0.058 (0.004)	7
DK	0.258 (0.008)	9	0.111 (0.012)	7	0.039 (0.006)	18	0.062 (0.012)	20	0.005 (0.002)	10	0.002 (0.001)	20	0.003 (0.001)	22	0.022 (0.007)	2
EE	0.324 (0.005)	24	0.162 (0.006)	22	0.057 (0.003)	25	0.085 (0.005)	23	0.012 (0.002)	24	0.002 (0.001)	22	0.003 (0.001)	21	0.105 (0.007)	25
EL	0.331 (0.006)	26	0.187 (0.006)	27	0.060 (0.002)	26	0.091 (0.005)	26	0.013 (0.002)	27	0.005 (0.001)	27	0.005 (0.001)	30	0.118 (0.007)	28
ES	0.329 (0.003)	25	0.188 (0.004)	28	0.063 (0.002)	27	0.095 (0.003)	27	0.010 (0.001)	22	0.003 (0.000)	23	0.003 (0.001)	23	0.116 (0.004)	27
FI	0.252 (0.005)	7	0.120 (0.007)	8	0.026 (0.002)	8	0.034 (0.003)	9	0.004 (0.001)	9	0.002 (0.000)	16	0.002 (0.001)	16	0.026 (0.005)	4
FR	0.290 (0.005)	18	0.124 (0.004)	11	0.026 (0.001)	7	0.033 (0.001)	7	0.013 (0.001)	26	0.005 (0.001)	28	0.005 (0.001)	27	0.069 (0.004)	10
HR	0.302 (0.003)	20	0.167 (0.005)	24	0.056 (0.002)	23	0.087 (0.004)	24	0.004 (0.001)	5	0.001 (0.000)	6	0.001 (0.000)	6	0.088 (0.005)	19
HU	0.275 (0.002)	14	0.137 (0.003)	17	0.028 (0.001)	11	0.035 (0.001)	10	0.005 (0.001)	12	0.001 (0.000)	7	0.001 (0.000)	7	0.102 (0.003)	23
IE	0.292 (0.005)	19	0.136 (0.008)	15	0.034 (0.003)	14	0.049 (0.005)	16	0.005 (0.001)	13	0.001 (0.000)	11	0.001 (0.000)	11	0.092 (0.008)	20
IS	0.241 (0.007)	3	0.122 (0.010)	9	0.035 (0.004)	15	0.048 (0.006)	15	0.001 (0.001)	2	0.000 (0.000)	2	0.001 (0.000)	2	0.025 (0.006)	3

Continued Table A1:

IT	0.310 (0.002)	21 0.184 (0.004)	26 0.066 (0.002)	28 0.115 (0.004)	29 0.007 (0.001)	19 0.002 (0.000)	18 0.002 (0.000)	18 0.002 (0.000)	0.099 (0.003)	22
LT	0.340 (0.005)	30 0.193 (0.009)	29 0.073 (0.004)	30 0.129 (0.010)	31 0.011 (0.002)	23 0.002 (0.000)	21 0.002 (0.001)	20 0.002 (0.001)	0.080 (0.007)	15
LU	0.272 (0.004)	13 0.140 (0.007)	18 0.028 (0.002)	10 0.035 (0.002)	11 0.005 (0.001)	11 0.001 (0.000)	12 0.002 (0.001)	13 0.002 (0.001)	0.119 (0.005)	29
LV	0.353 (0.004)	31 0.195 (0.005)	30 0.071 (0.002)	29 0.111 (0.004)	28 0.020 (0.002)	31 0.003 (0.000)	25 0.004 (0.000)	25 0.102 (0.005)	0.102 (0.005)	24
MT	0.269 (0.004)	11 0.130 (0.006)	13 0.027 (0.002)	9 0.033 (0.002)	8 0.007 (0.001)	16 0.001 (0.000)	8 0.001 (0.000)	8 0.001 (0.000)	0.076 (0.005)	14
NL	0.244 (0.004)	5 0.092 (0.008)	2 0.016 (0.002)	1 0.019 (0.002)	1 0.004 (0.001)	8 0.001 (0.000)	5 0.001 (0.000)	5 0.001 (0.000)	0.038 (0.004)	6
NO	0.221 (0.005)	1 0.092 (0.008)	1 0.023 (0.003)	3 0.032 (0.004)	5 0.002 (0.001)	4 0.001 (0.000)	4 0.001 (0.000)	4 0.031 (0.005)	0.031 (0.005)	5
PL	0.320 (0.003)	23 0.168 (0.003)	25 0.047 (0.001)	22 0.064 (0.002)	21 0.012 (0.001)	25 0.004 (0.000)	26 0.004 (0.001)	26 0.004 (0.001)	0.110 (0.004)	26
PT	0.332 (0.005)	28 0.153 (0.006)	21 0.042 (0.002)	20 0.056 (0.003)	19 0.018 (0.002)	30 0.005 (0.001)	29 0.005 (0.001)	29 0.005 (0.001)	0.092 (0.006)	21
RO	0.332 (0.004)	27 0.211 (0.005)	31 0.076 (0.003)	31 0.116 (0.005)	30 0.008 (0.001)	20 0.002 (0.000)	15 0.002 (0.000)	14 0.002 (0.000)	0.120 (0.005)	30
SE	0.237 (0.013)	2 0.136 (0.021)	16 0.043 (0.010)	21 0.090 (0.028)	25 0.001 (0.001)	1 0.000 (0.000)	1 0.000 (0.000)	1 0.000 (0.000)	0.022 (0.010)	1
SI	0.248 (0.004)	6 0.143 (0.008)	19 0.040 (0.003)	19 0.053 (0.004)	18 0.002 (0.001)	3 0.001 (0.000)	3 0.001 (0.000)	3 0.001 (0.000)	0.067 (0.005)	9
SK	0.259 (0.003)	10 0.127 (0.004)	12 0.036 (0.002)	17 0.050 (0.003)	17 0.004 (0.001)	6 0.001 (0.000)	9 0.001 (0.000)	10 0.001 (0.000)	0.062 (0.004)	8
UK	0.319 (0.006)	22 0.123 (0.005)	10 0.031 (0.002)	12 0.040 (0.002)	12 0.017 (0.002)	29 0.007 (0.001)	31 0.007 (0.001)	31 0.007 (0.001)	0.084 (0.006)	17

Note: All statistics refer to the equivalized disposable household income. Standard errors are calculated based on a bootstrap procedure with 500 draws and reported in parentheses.

Source: EU-SILC 2011 Cross-sectional (rev. 5 June 2015).

Wiemer Salverda

Household Income Inequalities and Labour Market Position in the European Union¹

INTRODUCTION

The study of income inequality has progressed since the top-income shares were published (Atkinson and Piketty 2007) and the OECD issued its first report (OECD 2008). This has greatly benefited the analysis of income inequality, but several important problems remain, which are addressed here.

The analysis of the relationship between gross incomes (focus of top incomes) and equivalized incomes (focus of OECD and EU policies) is underdeveloped. The latter derives from the former *via* income redistribution and equalization for household economies of scale. Equivalized incomes are often viewed as the result of taxation, although equalization plays an equally important role. It depends on household formation, which differs between countries and has changed strongly in recent decades. The linkage between individual earnings and household income distribution is equally underdeveloped, although earnings are by far the most important source of income. It is a tale of two literatures: of household income inequality and of individual wage inequality, with little contact (Salverda and Checchi 2015). Rapid increases in female employment and part-time employment, educational participation, and higher educational attainment have fundamentally transformed the relationship of households to the labour market, replacing the single full-time breadwinner with dual-earner and multiple-earner households and rising part-time hours, and, a far more complex relationship between earnings and incomes as a result. Finally, the distribution of incomes for the Union as a whole, has received little or no official attention – a serious *lacuna* given monetary unification and the long-run sustainability of the Union.

My aim is to empirically demonstrate the relevance of bridging the gaps for both the countries and the Union

as a whole (excl. Croatia), with a focus on gross wage earnings and the incomes of ‘labour households’ dependent on earnings. All of my work is based on the latest 2015 wave of the *European Union Statistics of Income and Living Conditions* (EU-SILC) with annual data for 2014, the only data available and far from perfect, a caveat to keep in mind.

The argument is presented in two main sections: firstly, the linkage between earnings, households and income inequality for the average country with a few words about variation around this average; and secondly, the position of the countries in an EU-wide income distribution. It concludes with a discussion and some policy implications.

THE AVERAGE COUNTRY

Importance of Labour Earnings

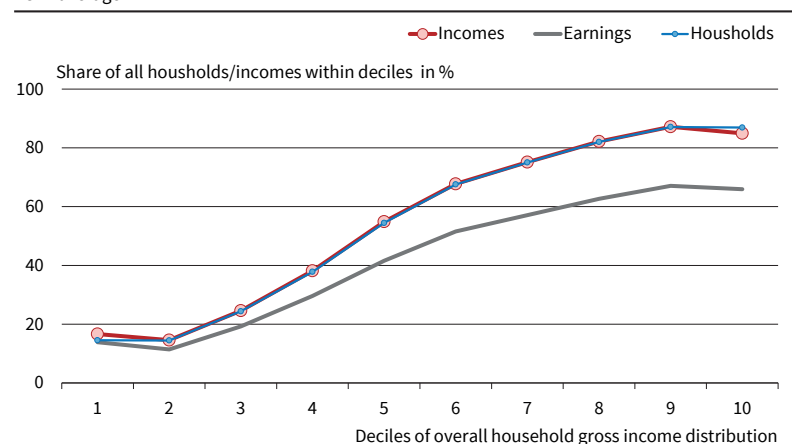
Across EU countries, labour households account for 54 percent of all households and receive 73 percent of total gross income; their earnings contribute 77 percent of their incomes. It makes earnings essential for studying incomes. Their position across the income distribution says the same for studying income inequality (Figure 1). The numbers, incomes and earnings increase strongly relative to all households along with the general level of income.

As combining numbers and earnings levels rise, their own distribution shows a strong gradient (Figure 2). Top-decile labour households obtain 35 percent of labour households’ total earnings, sixty times those of the bottom-decile. This rests largely on the combination into households of individual earnings, which do not rise that much. It brings 21 percent of all employees to the top. The breakdown by four household-earner types shows how the top is dominated by dual-earner and multiple-earner households. The percentages shown in the areas indicate their share in total earnings across the ten



Wiemer Salverda
University of
Amsterdam

Figure 1
Labour Households 2014: Numbers, Gross Incomes and Earnings
EU27 average

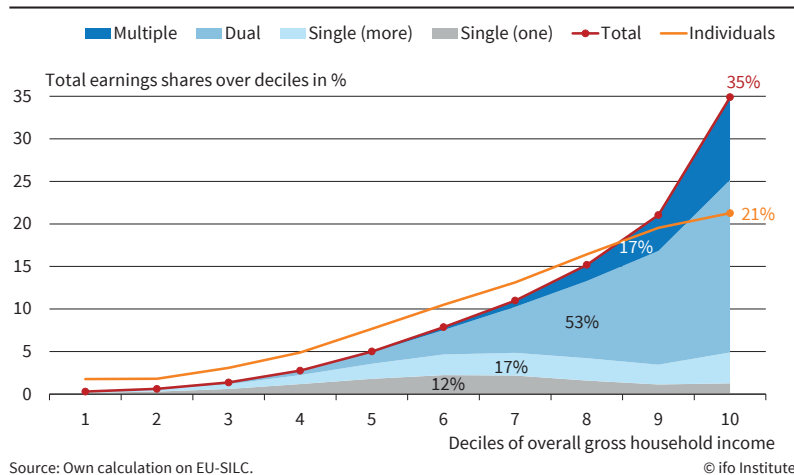


Source: Own calculation on EU-SILC.

© ifo Institute

¹ The author is grateful to Veerle Rook for her treatment of the EU-SILC data.

Figure 2
Labour Households 2014: Gross Earnings over Deciles and Household-earner Types
 EU27 average



deciles. The majority (53 percent) is received by dual earnings, while 12 percent and 17 percent respectively are received by the two types of single earners and the remaining 17 percent goes to multiple earner households.

It demonstrates how the combination of larger employee numbers and higher individual earnings help to explain the important role of labour households and earnings towards the top of the income distribution. This presents the labour context of household incomes, which cannot be adequately grasped by an exclusive focus on income distribution. Currently, three quarters of all employees share a household with at least one other employee, which draws attention to the household context of labour supply that may escape purely individual-based approaches. The world of the single breadwinner has gone. With one earner in the household working full-time, this meant a close relationship between household incomes and labour-market earnings, which has gone too.

Earnings Gradients

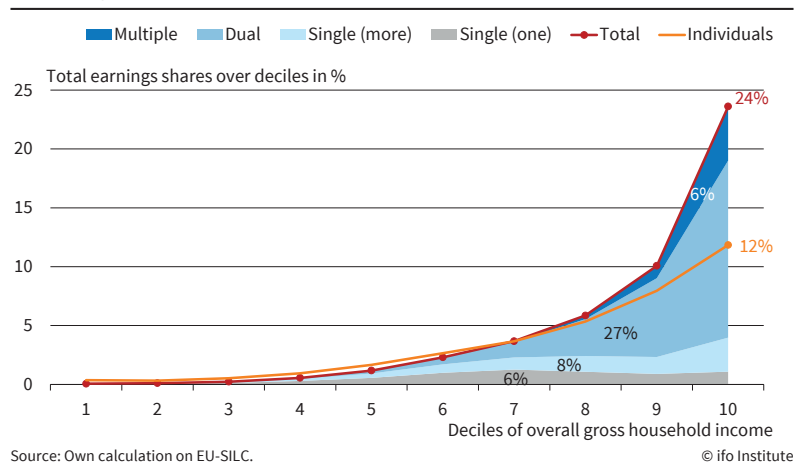
This shift has coincided with other drastic labour-market changes. Female employment, the educational participation of youth, and the educational attainment of the population have surged in recent decades, adding to strong international changes, aptly summarised by Freeman (2006) as ‘the doubling of the global work force’. Their significance for household earnings distribution differs substantially. Obviously, gender is central to most household formation and the gender

pay gap is a hotly debated issue. However, the gradient of female earners over the household deciles is surprisingly flat. Women comprise 47 percent of employees and receive 40 percent of total earnings. They do lag behind male earnings, but in a similar pattern for all deciles and household-earner types. Women also account for 10 percent of youth employees and 4 percent of earnings. Their strong concentration (53 percent) in multiple-earner households brings them that high up. A very steep gradient, however,

is found along the dimension of educational attainment: low, middle and high. The poorly-educated face a four to five-fold decline from the bottom to the top, while the middle-educated show stable shares, which decline substantially in the ninth and tenth deciles. This contrasts spectacularly with the highly-educated. They make up 35 percent of all individual earners and receive 48 percent of all earnings, strongly tilted towards the top. In the top decile they provide 12 percent out of 21 percent of all employees and 24 percent out of 35 percent of all earnings (Figure 3).

Highly-educated dual earners play a very important role as they obtain 27 percent of all earnings, just over half of all dual earnings (53 percent). Some 60 percent of highly-educated dual earners share a household with each other, and 72 percent do so in the top decile. As a result, almost half of the cohabiting highly-educated are found in the top decile. It is an important mechanism that can only grow stronger with increasing educational

Figure 3
Labour Households 2014: High-educated Employee Earnings over Deciles and Household-earner Types
 EU27 average



attainment and growing employment differentials by educational attainment.

Vicious Circle for Low-paid Jobs

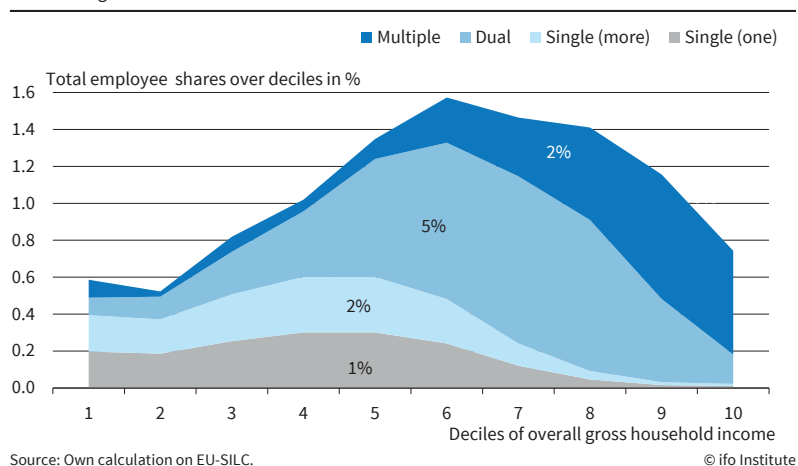
An important effect of this interaction between incomes and earnings is found on the jobs side. In the single-breadwinner world the one source of pay in the household together with the uniformity of full-time working hours keeps employees with low-paid jobs (by the hour) in the lower ranks of the income distribution. This contrasts fundamentally with the world of dual and multiple earners, who can also work part-time hours more easily. Low-wage jobs can now be found all over the income distribution. Using elementary jobs as *pars pro toto* demonstrates the broad spread of low-paid jobs over the income distribution.² Two thirds of them are concentrated in the 5th to 9th deciles, and more are actually found in the top decile than in the first or second decile (Figure 4).

This largely corresponds with dual-earner and multiple-earner households, which taken together comprise 70 percent of elementary workers, 63 percent of whom are found in deciles 5 to 10, and 44 percent of whom, in turn, are secondary earners. It suggests a radical change in the functioning of the low-wage segment of the labour market: labour supply originating in well-to-do households competes with other individuals, who are probably less educated and will depend on full-time hours to generate appropriate income.³ Thus a vicious circle of earnings and income inequality is established where income inequality results in greater difficulty

² Elementary jobs act as a second-best solution, as SILC data on hours worked are missing for many countries and low pay cannot be properly observed. These jobs concern least-skilled jobs according of the international classification of occupational levels (ISCO), comprising 10 percent of all employees and obtaining 6 percent of all earnings.

³ In the Netherlands 80 percent of the least skilled jobs are occupied on a part-time basis and by better-skilled persons (Salverda 2016).

Figure 4
Labour Households 2014: Elementary Employees over Deciles and Household-earner Types
EU27 average



for the low-skilled to find adequate employment, which in turn augments income inequality (see also Salverda 2016).

Differences in Redistribution and Equalization

We now turn from gross incomes to equivalized ones, the common currency of income policies. The EU definition of monetary poverty as incomes below 60 percent of median equivalized household income is a case in point. These incomes are two subsequent steps away from gross income: firstly, the move towards disposable income through redistribution: the deduction of income taxes and social contributions; and secondly, the step towards equivalized income through equalization: the attribution of a comparative value that the disposable income has for the receiving household, given the number of persons dependent on it and the economies of scale they may realize as a household (e.g. one house, fridge, etc.).⁴ The steps are seldom considered separately, despite the fact that both are quantitatively important and that they depend on different factors: government policy making for the first step and people's household formation for the second.⁵ That formation has evolved considerably over time (more singles, fewer children) and also differs between countries. Therefore, it would be a mistake to attribute equivalized incomes entirely to redistributive policies.

Redistribution and equalization reduce the share of total income accounted for by labour households, as the latter have above-average incomes and household size and therefore pay more taxes and face stronger equalization. Their share decreases from 73 percent of gross incomes, via 66 percent of disposable incomes to 62 percent of equivalized incomes. Importantly, the steps also affect income distribution itself, or the ranking of households by the applicable income level. Figure 5 indicates the corresponding shifts for the gross

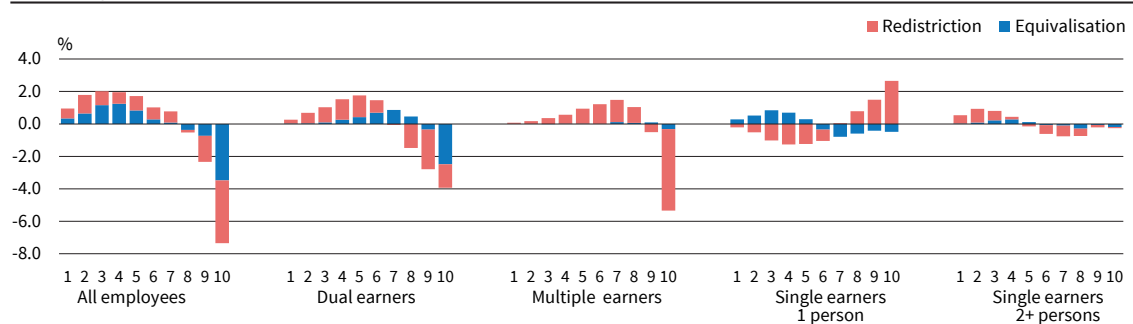
earnings that households take with them when they shift from their (decile) position in one distribution to a different position in another distribution. For all employees the highest three deciles

⁴ Unlike taxation and contributions which are observed quantities, equalization is an arbitrary interpretation by researchers and policymakers. It can be done in different ways, depending on the weight given to economies of scale. I follow SILC's use of the modified OECD equivalence scale.

⁵ This also applies to, for example, the OECD's Income Distribution Database, which equalizes both gross and net incomes to study the effects of redistribution. However, this keeps household formation effects entirely out of sight. In addition, Salverda (2014) argues that this may lead to an underestimation of redistribution.

Figure 5

Labour Households 2014: Between-decile Shifts of Gross Earnings from the Gross to the Net to the Equalized Income Distribution
EU27 average



Source: Own calculation on EU-SILC.

© ifo Institute

shrink to the advantage of the lower seven. The effect is particularly large for top-10 percent households. All being expressed in percentage points of total gross earnings, a breakdown into changes of the household-earner types shows significant differences between the four types. Dual earners and multiple earners bear the brunt of the downward shifts. Dual earners do so mainly because of redistribution, probably because they earn more individually and pay higher taxes. Multiple earners are affected primarily because of equalization, probably as they combine larger households leading to stronger equalization, and lower individual earnings that are less exposed to taxation. One-person single earners move up towards the top and more-person single earners remain virtually unchanged at the top, but shrink in deciles 6 to 8 to the advantage of deciles 1 to 4. Redistribution and equalization work mostly in the same direction, with the exception of one-person single earners where inverse movements can be seen, reflecting higher incomes in combination with smaller households. Clearly, it is important to pay attention to both effects and keep them separate.

In-work Poverty

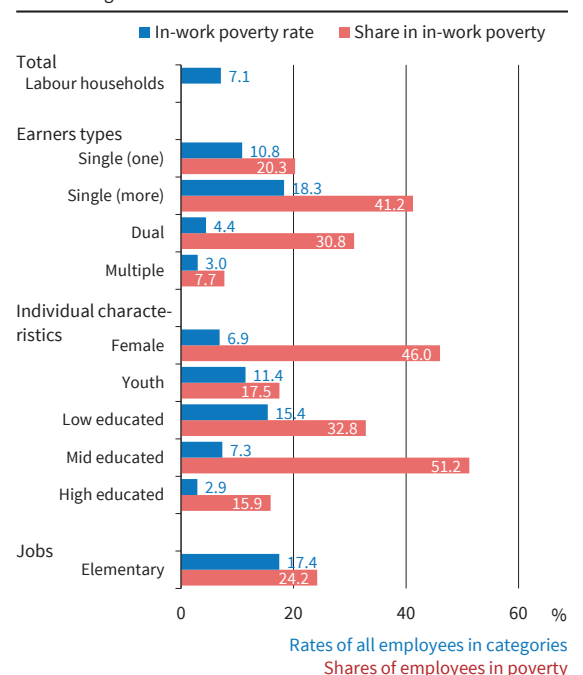
Monetary poverty is a measure of inequality situated in the lower range of equalized incomes. The average poverty rate is 16 percent for all households, and 9 percent for labour households only. The share of poor labour households among all poor households is 30 percent. So most poor households do not depend on earnings for their main incomes. The poverty rate among employees is 7 percent, which is less than for labour households because dual-earner households (4 percent) and multiple-earner households (3 percent) experience significantly lower rates compared to single earners – 11 percent and 18 percent respectively (Figure 6). Bringing two or three or more earners together in a household seems a sensible strategy for escaping poverty. The traditional single earners with a dependent household, however, face a significantly higher poverty rate of 18 percent,

which exceeds the overall rate of 16 percent. Of all poor employees 41 percent belong to this category. The two observations underline the seriousness of in-work poverty and the relevance of distinguishing household-earner types.

The dimensions of gender, age and educational attainment mirror the above findings concerning the earnings gradients. Average poverty rates and shares are found for women and the middle educated, a somewhat higher rate (11 percent) for youth. The rate of the low educated (15 percent) seems modest, probably because an important share of them is secondary earners higher up the distribution. The rate for the high educated (3 percent) is well below average. Finally, on the labour-market side, employees with an elementary job run a substantial risk (17 percent) of poverty.

Figure 6

Labour Households 2014: Poverty Rates and Shares among Poor Employees
EU27 average



Source: Own calculation on EU-SILC.

© ifo Institute

Nonetheless, this leaves 83 percent of employees in those purportedly low-paid jobs who are members of non-poor labour households (see also Salverda 2018).

The two steps of redistribution and equalization apply equally to the in-work poor. They appear to lose 18 percent of their gross incomes due to redistribution and another 37 percent of same gross incomes due to equalization. This brings them to an average level of equalized income at 26 percent below the poverty threshold (the poverty gap). Changing the level of taxation could certainly help to alleviate the problem, but it will not go far enough. Accounting for larger household sizes seems a necessary part of the strategy. The systematic eradication of child poverty belongs to that category.

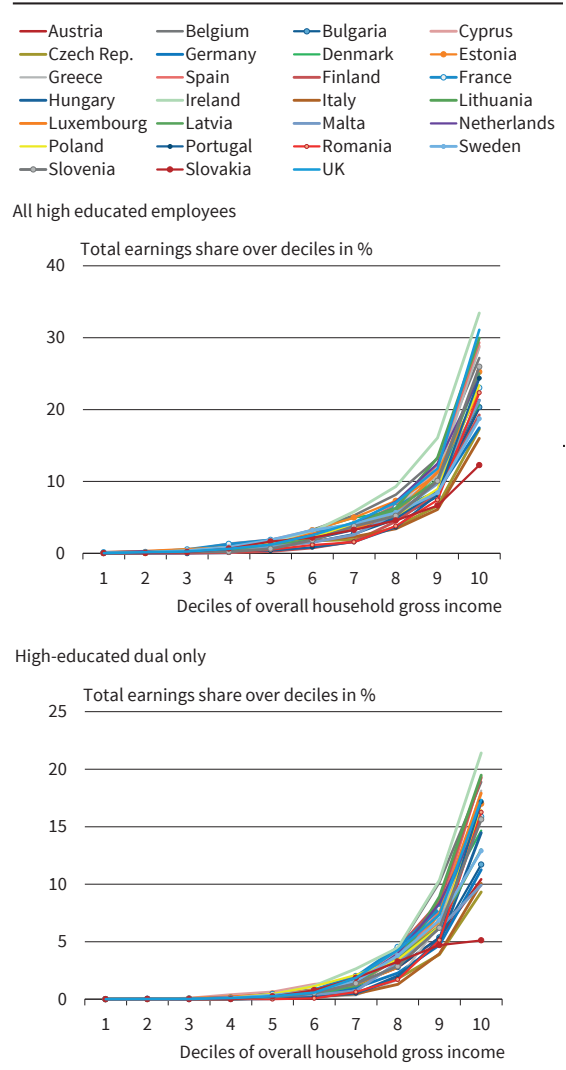
Country Variation

So far, I have pictured inequalities with the stylized strokes of the average EU country. Obviously, EU countries harbour important variation around the average. It is beyond the scope of this contribution to discuss that question in detail. The main issue is whether the basic findings apply: the large role of labour households, the relevance of distinguishing household-earner types, the strong contribution of high-educated employees and its link to dual earning, the vicious circle in the low-wage segment of the labour market, the differential effects of redistribution and equalization, and the structure of in-work poverty.

There can be no doubt that labour households make by far the largest contribution to incomes and income inequality in all countries: their contribution to the top decile always exceeds the average contribution. Their incomes are above-average nationally, but equal to the average at the top. Greece and Italy are laggards by international comparison, as labour households number between 35 and 45 percent of all households only. Their incomes, however, account for 50 to 60 percent of the total, which leaves insufficient room so that others could exceed. They also play a smaller role at the top in the two countries. Interestingly, this goes together with the smallest role for dual earners, negatively demonstrating the relevance of looking at household-earner types. Denmark, Estonia and Latvia, at the other end of the scale, make the largest overall contribution, for the top share and for the importance of dual earners. Multiple earners make the largest contributions in Malta and Slovakia. Generally, the share of dual-earner households is the most comparable across the countries, while the shares of single earners and multiple earners are inversely related to each other and each show more cross-country variation.

The gradients that we have considered, by gender, age and education, follow broadly the same trends over the deciles in all countries: rather flat for women and youth, declining throughout for the low educated, flat first and then declining for the middle educated.

Figure 7
Labour Households 2014: High-educated Employee Earnings over Deciles
27 EU countries



Source: Own calculation on EU-SILC. © ifo Institute

These observations apply particularly to the upper half of the distribution, as there is more variation in the bottom half, where numbers are (very) small and can be erratic. This contrasts again with sharp increases for the highly educated (shown in Figure 7, comparable to the total earnings line of Figure 3, which increased to 24 percent in decile 10). The upper panel of Figure 7 shows the earnings gradient for all highly-educated employees while the lower one shows (at a different scale) the contribution made by dual earners among the highly-educated. Across all countries dual earners contribute half or more to the earnings of all highly-educated in the top-10 percent, with the notable exceptions of Malta and Slovakia countries due to the large role of multiple earners. Similarly, the incidence of elementary jobs across the income distribution of Figure 4, that suggests a vicious circle between income inequality and low-wage employment, is replicated in most countries.

The volume of elementary employment at the top always exceeds that at the bottom.

As to redistribution and equalization both effects are significant and different from each other in all countries. Redistribution brings most households down for all household-earner types with a few exceptions for multiple-earner households and more-person single earners. This contrasts with equalization, which shifts down across the board with growing household size – dual and multiple earners, and in many but not all cases, also the more-person households of single earners. Finally, the lion share of in-work poverty is always allocated to more-person single earners.

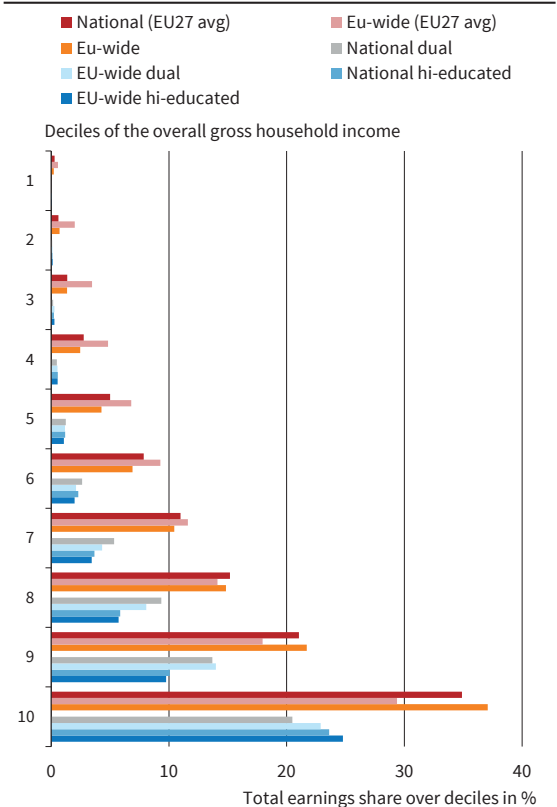
As a general conclusion, by and large the individual country trends are qualitatively the same as the average, albeit with some quantitative variation. For example, although the share of the highly-educated among all employees may differ, as well as their concentration at the top, and their relative earnings, they always show the most important earnings gradient supported by the largest role for dual earners.

THE UNION PERSPECTIVE

One can also look at the relationship of income inequality and earnings from the viewpoint of the European Union considered as a single entity. Contrary to the above perspective of the average EU country, which aimed to understand the relative patterns and their (dis)similarities, the EU-wide approach helps to grasp how the countries compare to each other in an absolute sense, by identifying their positions in the overall distribution, and particularly in fractiles such as the top-10 percent and poverty, on which I will focus here for the sake of brevity.

Meaningful EU-wide distributions of incomes and earnings are drawn by applying purchasing power parities (PPP) to the individual incomes and earnings of the countries. PPP indicates how countries’ price levels deviate from the EU average, comparing what the same amount of money can buy in real terms in different countries. Usually this is less in richer countries compared to poorer ones (Salverda 2015). The EU-wide distribution does not affect the within-country inequalities and mechanisms discussed above, as the PPPs effectively signify linear transformations. Numbers, household-earner types and individual characteristics remain unchanged, but they will be differently distributed in the EU distribution compared to the country distributions, depending on both the country’s price level and level of inequality. The EU-wide distribution weights the countries, as it includes all individual observations. This differs from the unweighted countries’ average insofar as the roles of characteristics and types diverge by country size. For parts of the EU-wide distribution one can still consider unweighted countries’ averages – their comparison

Figure 8
Household Earnings over Deciles, National and EU-wide, 2014



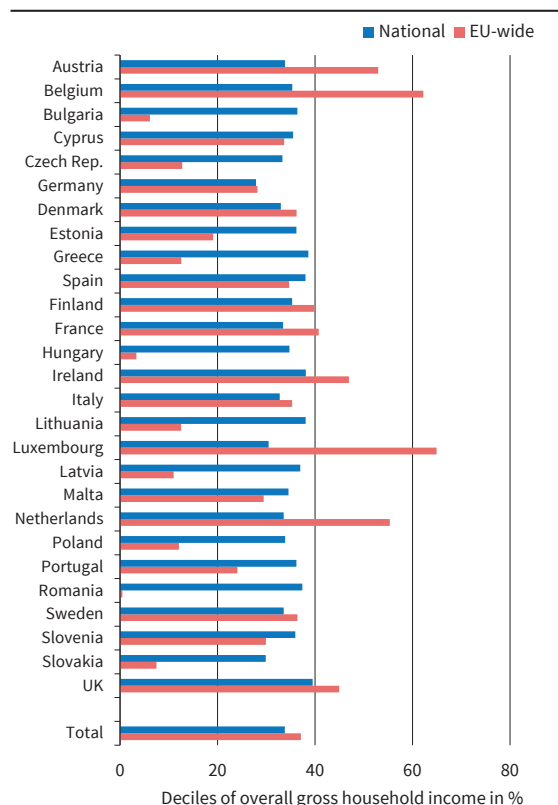
Source: Own calculation on EU-SILC. © ifo Institute

to the above findings most directly indicates the differences that the EU-wide approach makes to the national figure.

EU-wide inequality, as measured by the percentile ratio P90:P10 differs from average national inequality: 11.7 as against 9.7 for gross incomes and 5.4 to 4.0 for equalized incomes, but these EU-wide levels are well within the range covered by the individual countries. Differences are small for the upper half of the distribution (P90:P50) and reside largely in the bottom half, but the P50:P10 ratio is still within the national range there too.

Labour households and their earnings are equally important for the Union as a whole, despite some divergence from the national average (the three larger bars of Figure 8). The total EU-wide pattern of inequality (top-10 percent: 37 percent) exceeds the national country average (35 percent), while the EU-wide country average lies far below (29 percent). Apparently, countries that have larger top shares have larger populations. This paper focuses, however, on EU-wide distribution, which is what that we would ideally like to influence. The four smaller bars to the right of the large ones (Figure 8) show that the higher levels at the top of the EU-wide distribution are accompanied by equally higher levels for dual earners and highly educated employees. This underlines the importance of the main mechanism found at the national level for the EU as a whole.

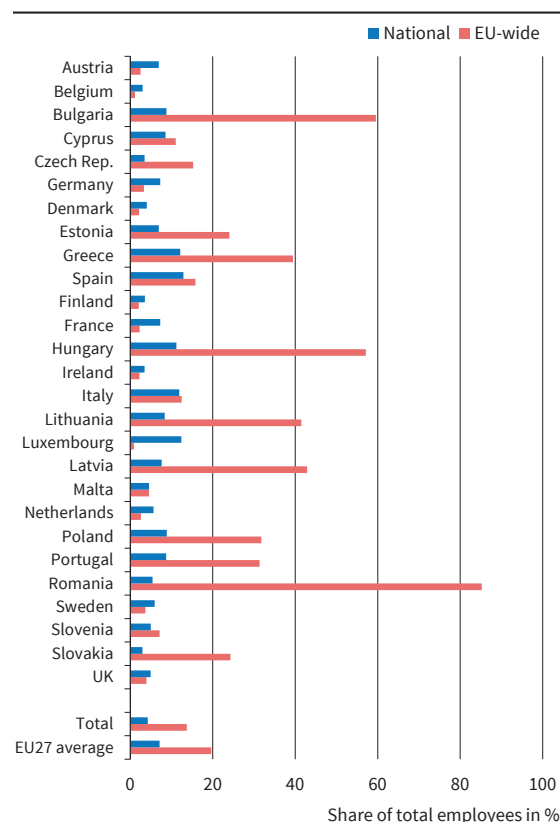
Figure 9
Labour Households 2014: Shares of Top-10% Earnings



Source: Own calculation on EU-SILC.

© ifo Institute

Figure 10
Labour Households 2014: In-work Poverty Rates



Source: Own calculation on EU-SILC.

© ifo Institute

These differences between distributions still look modest. However, below this aggregate picture lie strong country effects that reflect their absolute positions in EU-wide distribution. Figure 8 shows the largest difference in the top-10 percent and I focus on that. This masks a sharp reshuffling of the countries between national levels and their EU-wide counterparts (Figure 9). Eleven countries witness growing shares, especially in Austria, Belgium, Luxembourg and the Netherlands where the majority of all employees belongs to the EU-wide top-10 percent, while Ireland and Britain come close to this group. Increases are small or modest in Denmark, Germany, Finland, France, Ireland, Italy and Sweden. The fact that the Union's largest four countries are in this category contributes to the gap found between the EU-wide total and the EU-wide country average. It also tilts the geographical composition of the European top-10 percent in their direction, from 52 percent of all top-10 percent employees to 62 percent. The other sixteen countries witness declines, which are particularly sharp in the Baltic states, Bulgaria, Czech Republic, Greece, Hungary, Poland, Romania and Slovakia. Hardly any Bulgarian, Hungarian, or Romanian employees are found in the European top-10 percent. The very low top shares for so many countries explain the much lower EU-wide country average compared to the national figure. By implication, the highly educated workers in these countries can hardly reach the top.

Their profile over EU-wide deciles therefore becomes entirely flat, in contrast with the overall rise seen in Figure 7. It is easy to understand the attraction that migrating to a better paid job elsewhere may exert on this category of workers.

The EU-wide incidence of in-work poverty equals 14 percent, twice the national average of 7 percent. Again, country size plays a significant role, as the EU-wide country average attains a much higher level of 20 percent, in contrast with the lowering effect found previously for the top-10 percent. The larger countries, except for Italy, experience low poverty levels. For poverty, being situated at the lower end of the earnings distribution, the shifts go in the opposite direction: they are higher in poor countries and lower in the richer ones. Poverty rates shrink to negligible proportions in EU15 countries, with the exception of Greece, Portugal and Spain. By contrast, they reach dramatic levels elsewhere (Figure 10). The rate shoots up in an extreme fashion for Romania, from 9 percent of all employees nationally to 88 percent EU-wide, and rates increase to (close to) majorities in the other countries that are absent from the European top-10 percent: Bulgaria, Greece, Hungary, Latvia and Lithuania. The poverty rates are also multiplied in Estonia, Poland, Portugal and Slovakia. These extreme levels mean that very large sections of the population, along all dimensions and not just the highly educated, will have

incentives to migrate to other countries to seek better pay. The gaps are so immense that it seems impossible for spontaneous wage formation in the labour market to solve the problem within any reasonable time frame.

DISCUSSION

Labour households appear to strongly stratify the distribution of household incomes, primarily because of the combination of individual earnings in dual-earner and multiple-earner households, with a major role for the highly educated, who are heavily concentrated in the top-10 percent. Single earners account for around one quarter of all employees and only 10 percent of top-10 percent employees. Compared to the bygone world of full-time working single breadwinners, when earnings and incomes fundamentally coincided and high earnings reflected high pay, the relationship between earnings and incomes has become far more complex. This takes away the power that social partners used to have to influence the income distribution from the labour market. Low-paid jobs are now found up to the top of the income distribution, where their presence and earnings exceed those at the bottom. The implications are that low pay coincides less with in-work poverty and is largely concentrated in non-poor households with higher incomes (Salverda 2018), and that low-wage jobs may become fragmented and job competition tilted against the poorly educated, instituting a self-reinforcing feedback from household income inequality to individual earnings inequality and employment inequality and then back to household income inequality. Going from gross to net to equivalized incomes, we find that both steps are quantitatively important and significantly different between household-earner types, for income distribution as a whole, as well as in-work poverty. This warrants paying special attention to the effects of (changing) household formation in addition to income redistribution through taxation and social insurance. These findings for the average country are largely shared across EU countries, albeit with quantitative variation. The important role of high-educated dual earners is found for all countries.

Secondly, for EU-wide income distribution, based on PPPs, we find modest levels of inequality that fit within the range covered by the countries. This is accompanied, however, by extremely drastic compositional changes for the countries over the distribution. Some countries lose the presence of any employees in the top decile who are replaced by other countries, some of which now have over half their employees in that top decile. The losing countries are overwhelmed by EU-wide poverty: close to 90 percent of Romanian employees and almost 50 percent or more for Bulgaria, Greece, Hungary, Lithuania and Latvia.

These figures clearly show that the Union is facing a vast problem of inequality as a stumbling block on its path towards social and economic integration. International migration will never grind to a halt as long as this continues.

What can we expect for the future of income inequality? Without intervention the broader inequality of household market-incomes will tend to grow, especially for labour earnings. Dual earning is here to stay and will only increase, and rightly so; its income effects are being reinforced as partners shift from part-time to full-time employment and their earnings correlation grows with the correlation of their educational attainment. Over time labour households and their earnings seem to be drifting upwards like a tectonic plate towards the top of the income distribution.⁶

Can policies change this? The concern with economic inequality will take centre stage in European policy making. Current EU policy making in the framework of EU2020 concerns poverty only and is legally weak. Moreover, it does not apply to policy making at the European level itself (think of Troika actions). Any future governance of the Union aimed at reversing the trend towards growing inequality into a declining one needs to address the mechanism behind its growth. A focus on poverty and redistribution alone can only try to match growing market inequalities with enhanced redistribution and will quickly run into the constraints of available means. The distribution of market incomes needs to be addressed systematically. An EU-wide agreement on a minimum wage – or effective equivalent – at a significant level is needed and should be accompanied by a revision of tax systems that accounts for the growing divergence between individual earnings in the labour market and incomes of household based on their combination. It stipulates the need for thoughtful income redistribution through earned income tax credit (EITC) and a European child basic income (Atkinson 2013) aimed at taking children out of the equation of earnings and policymaking for adults. The dual-earner world blunts traditional measures of redistribution and inequality reduction, which target low individual earnings (tax credits, minimum wage), but may actually benefit higher-income households comprising low-pay earners. It means that dead-weight loss will increase for measures needed by those fully depending on low-wage jobs – that has to be accepted and the addition to higher incomes may be taxed away to contribute to financing the EITC and other measures.

REFERENCES

Atkinson, A.B. (2013), *Ensuring Social Inclusion in Changing Labour and Capital Markets*, European Economy - Economic Paper 481,

⁶ This time dimension is not available for EU27 but see Salverda and Haas (2014) for a similar EU analysis for 2009-2010, and Salverda and Thewissen (2018) for a detailed country example.

http://ec.europa.eu/economy_finance/publications/economic_paper/2013/pdf/ecp481_en.pdf.

Atkinson, A.B. and T. Piketty (eds., 2007), *Top Incomes over the Twentieth Century: A Contrast between Continental European and English-Speaking Countries*, Oxford: Oxford University Press.

Freeman, R. (2006), *The Great Doubling: The Challenge of the New Global Labor Market*, http://emlab.berkeley.edu/users/webfac/eichengreen/e183_sp07/great_doub.pdf.

OECD (2008), *Growing Unequal? Income Distribution and Poverty in OECD Countries*, Paris.

Salverda, W. (2014), "Can Income Redistribution Help Changing Rising Inequality?", *Progressive Economy* 2, 39–47.

Salverda, W. (2015), *EU Policy Making and Growing Inequalities*, European Economy – Discussion Paper 008, http://ec.europa.eu/economy_finance/publications/eedp/pdf/dp008_en.pdf.

Salverda, W. (2016), *The Tsunamis of Educational Attainment and Part-time Employment, and the Change of the Labour Force 1960-2010: What Can Be Learned about Self-reinforcing Labour Market Inequality from the Case of the Netherlands in International Comparison?*, ImPRovE Discussion Paper 16/04, Herman Deleeck Centre for Social Policy – University of Antwerp.

Salverda, W. (2018), "Low Earnings and Their Drivers in Relation to In-work Poverty", in: Lohmann, H. and I. Marx (eds.), *Handbook of Research on In-work Poverty*, Cheltenham: Edward Elgar, 26–49.

Salverda, W. and D. Checchi (2015), "Labour-market Institutions and the Dispersion of Wage Earnings", in: Atkinson, A.B. and F. Bourguignon (eds.), *Handbook of Income Distribution* 2B, North Holland: Elsevier, 1535–1727.

Salverda, W. and C. Haas (2014), "Earnings, Employment and Income Inequality", in: Salverda, W., B. Nolan, D. Checchi, I. Marx, A. McKnight, I.G. Tóth and H. van de Werfhorst (eds., 2014), *Changing Inequalities in Rich Countries: Analytical and Comparative Perspectives*, Oxford: Oxford University Press, 49–81.

Salverda, W. and S. Thewissen (2018), "How Has the Middle Fared in the Netherlands? A Tale of Stagnation and Population Shifts", in: Nolan, B. (ed.), *Inequality and Inclusive Growth in Rich Countries: Shared Challenges and Contrasting Fortunes*, Oxford: Oxford University Press, forthcoming.

Alexander Guschanski and
Özlem Onaran

Determinants of the Wage Share: A Cross-country Comparison Using Sectoral Data¹



Alexander Guschanski
University of
Greenwich



Özlem Onaran
University of
Greenwich

INTRODUCTION

There has been a significant decline in the share of wages in GDP in both developed and developing countries since the 1980s. This paper analyses the determinants of the wage share (labour compensation as a ratio to value added) for the 1970–2011 period using sectoral data with country specific estimations for six OECD countries: France, Germany, Italy, Spain, Britain, and the United States.

There are two main hypotheses put forward to explain the decline in the wage share: the technological change hypothesis posits that the labour share declined due to capital augmenting technological change or an increase in the capital intensity of production. The bargaining power hypothesis attributes the decline in the labour share to a decline in the bargaining power of labour, induced by changes in government policy, labour market institutions or financialisation. We argue that the relevance of these factors differs across countries along three lines:

1. The relevance of labour market institutions depends on the bargaining regime. For example, union density is likely to be particularly relevant in countries with highly coordinated bargaining regimes, whereas bargaining coverage and social government expenditure is potentially more relevant in a decentralised bargaining environment.
2. The effect of globalisation on the wage share depends on whether market or cost seeking activities dominate, which is likely to differ by country and industry group.
3. The effect of technology might differ depending on the production structure in the economy, the type of goods the country specialises in, as well as across high- and low-skilled sectors.

Previous research either focuses on one individual country or uses panel data that pools countries, which does not offer a satisfactory account for country-specific differences. Our contribution consists in providing country-specific estimations using an industry-level dataset for the largest economies in

¹ This paper has received a research grant from the Institute for New Economic Thinking. The usual disclaimers apply.

the EU and the United States. Our sample allows to assess how the effect of labour market institutions on the wage share depends on the underlying bargaining regime. Furthermore, while industry level data on FDI or intermediate imports does not allow for a differentiation between market or cost seeking activities, we can analyse whether trade in a particular country is more of a market seeking or cost seeking nature by conducting country-specific estimations.²

Previous contributions mainly focus on either the technological change or the bargaining power hypothesis. The previous research focusing on the impact of bargaining power on the wage share uses mostly aggregate country level panel data, which does not differentiate the results across skill groups and industries (ILO 2011; Jayadev 2007; Kristal 2010; Onaran 2009; Stockhammer 2009 and 2017). Within the literature that argues the primacy of technological change, Bassanini and Manfredi (2014), Karabarbounis and Neiman (2014), and IMF (2017) use industry as well as country panel data; however they barely control for variables reflecting the bargaining power of labour and labour market institutions, welfare state retrenchment or financialisation.³ Guschanski and Onaran (2017a, 2017b and 2018) provide a comprehensive analysis of both hypotheses. However, they pool countries (Guschanski and Onaran 2017a and 2017b), or use firm-level data (Guschanski and Onaran 2018). Lin and Tomaskovic-Devey (2013), and Onaran (2011 and 2012) are closest to our analysis, but while these studies focus on a single country, the United States and Austria respectively, we perform our analysis for six OECD countries, control more thoroughly for measures of technological change and incorporate a broader range of explanatory variables.

Our findings provide new insights regarding the drivers of the falling wage share. We confirm previous research based on the analysis of country-level panel data attributing the decline in the wage share to a decline in bargaining power of labour driven by changes in labour market institutions, financialisation and globalisation. However, we find that these factors impact countries and skill groups within countries differently, thereby confirming the utmost relevance of country specific institutional setting in determining income distribution. Specifically, we find that union density is the most relevant measure of the bargaining power of labour in highly coordinated bargaining

² Furthermore, while country-level analysis always faces the question as to whether the decline in the wage share captures changes in the sectoral composition rather than a decline of the wage share within sectors, we are able to isolate the within sector development of the wage share, while abstracting from changes in the sectoral composition. Indeed, we find that the wage share declined within the large majority of industries in our sample, including within high- and low-skilled sectors. This confirms previous findings by Karabarbounis and Neiman (2014); and Rodriguez and Jayadev (2010), attributing the decline in the wage share mainly to within-industry changes.

³ IMF (2017) controls for union density, employment protection legislation and corporate taxation at the country level in some sector level estimations for different skill groups, while Bentolila and Saint-Paul (2003) control for the strike rate at the country level.

regimes (Germany, Italy, Spain), while collective bargaining coverage and social government spending is more important in countries where firm-level bargaining dominates (France, Britain, the United States). Financialisation reduced the bargaining power of labour mainly in Britain and the United States, and to some extent in Germany. Different measures of globalisation had an impact on the wage share in all countries. Although we also find some evidence for a negative impact of technological change in the United States, Italy and Spain, our results indicate that the decline in the wage share is not an inevitable outcome of technological progress. Rather, reversing the decline in the wage share requires institutional changes that bring the bargaining power of labour more in balance with that of capital.

The remainder of the paper is organised as follows. The second section provides a review of the literature on the determinants of functional income distribution, as well as some stylised facts on the countries in our sample. The third section outlines our empirical strategy, followed by the fourth section which presents the estimation results. The final section concludes.

WHAT DRIVES THE DECLINE IN THE WAGE SHARE?

The Technological Change Hypothesis

The technological change hypothesis posits that the labour share declined due to capital augmenting technological change or an increase in the capital-output ratio. Several studies argue that technological progress was capital augmenting since the 1980s (Bassanini and Manfredi 2014; European Commission 2007). This increases the amount of output that can be produced from a given unit of capital and can have a negative impact on the labour share. A related stream of literature argues that technological progress in the last four decades contributed to a decline in the price of capital relative to labour. If firms are optimising, this will lead to a substitution of capital for labour and an increase in the capital-output ratio, referred to as ‘capital intensity’ (Karabarbounis and Neiman 2014). However, the effect of these two variables on the labour share depends on the elasticity of substitution between capital and labour. More precisely, the necessary assumption for a negative effect of capital augmenting technological change and capital intensity on the labour share is that the elasticity of substitution between capital and labour is larger than one (Bentolila and Saint-Paul 2003). We obtain the cases shown in Table 1.

Table 1

Different Elasticities of Substitution between Capital and Labour and the Effect of Technological Change on the Labour Share

Elasticity of substitution	Effect of capital intensity and capital augmenting technological change on the wage share	Description
> 1	< 0	K and L are strong substitutes → technological change has a negative impact
$= 1$	$= 0$	Unitary elasticity (Cobb-Douglas production) → no impact of technological change
< 1	> 0	K and L are weak substitutes → technological change has a positive impact

Source: Authors' own compilation.

It is usually assumed that capital is a substitute for low-skilled labour, whereas it complements high-skilled labour – therefore we expect a negative effect in the former and a positive effect in the latter case.

The ratio of capital to value added, often differentiated by ICT and non-ICT capital, is usually applied as a measure of technological change in the literature. Most prominently, Karabarbounis and Neiman (2014) provide evidence for a negative effect of technological change on the wage share and increasing capital intensity worldwide, implying an elasticity of substitution above one. According to their estimations, about half of the global decline in the labour share can be explained by a reduction in the relative price of capital. Similarly, Bentolila and Saint-Paul (2003), and Bassanini and Manfredi (2014) obtain significant negative effects of capital intensity as well as total factor productivity (used as a proxy for capital augmenting technological change) in OECD countries, again implying an elasticity of substitution larger than one. IMF (2017) fail to find a significant effect of the relative price of investment on the wage share for tradable sectors, while there is some evidence for a negative effect in non-tradable sectors with a high initial exposure to routinisation. In contrast, analyses by Elsby *et al.* (2012), Harrison (2002), ILO (2011) and Stockhammer (2009 and 2017) find none or a positive effect of capital intensity, implying an elasticity of substitution that is below or equal to one. This is supported by studies whose primary focus lies on the estimation of the elasticity of substitution between capital and labour – the majority of these analyses consistently find values below one and closer to 0.4 (Chirinko 2008; Chirinko and Mallick 2014; Rowthorn 2014). The value of the elasticity of substitution between capital and labour is one of the most contested topics in economic research. However, there is relatively little research on the determinants of this parameter.⁴ Usually, the elasticity is assumed to be given by technology and only subject to change

⁴ IMF (2017) propose a model, where globalisation leads to offshoring of goods with a low elasticity of substitution from advanced to emerging economies, thereby increasing the share of tasks with low elasticity of substitution in emerging economies.

over the very long run. Since the determinants of the elasticity of substitution are largely unobservable as well as task-specific, it is not possible to formulate a hypothesis about the effect of capital intensity on the labour share in a particular country or industry *a priori*. In general, we expect a negative effect to be more likely in low-skill industries, whereas the effect should be positive in high-skilled industries, if these classifications accurately represent the skill-level of the representative task in the industry.⁵

We could also observe a negative relation between capital intensity and the wage share that has nothing to do with substitution of capital for labour. For example, if firms set prices to achieve a certain target profit rate an increase in the capital stock will be associated with a higher mark-up to increase profits and keep the profit rate constant (Lavoie 2014).⁶

⁵ A specific hypothesis suggesting a negative impact of technological change on medium-skilled workers is put forward by the literature on job polarization. According to this research, technological progress in the last decades was driven by Information and Communication Technology (ICT), that allowed to replace workers by machines for tasks that are easily automatized, which were mainly performed by medium-skilled workers (Autor and Dorn 2013; Goos *et al.* 2014; IMF 2017). As we apply a binary sectoral classification, this implies that some sectors classified as high-skilled might also be negatively affected by technological change.

⁶ To be precise, it would be a negative relation between the wage share and the capital stock to normal output level, i.e. the output level firms expect to sell which may be below the full-capacity output level.

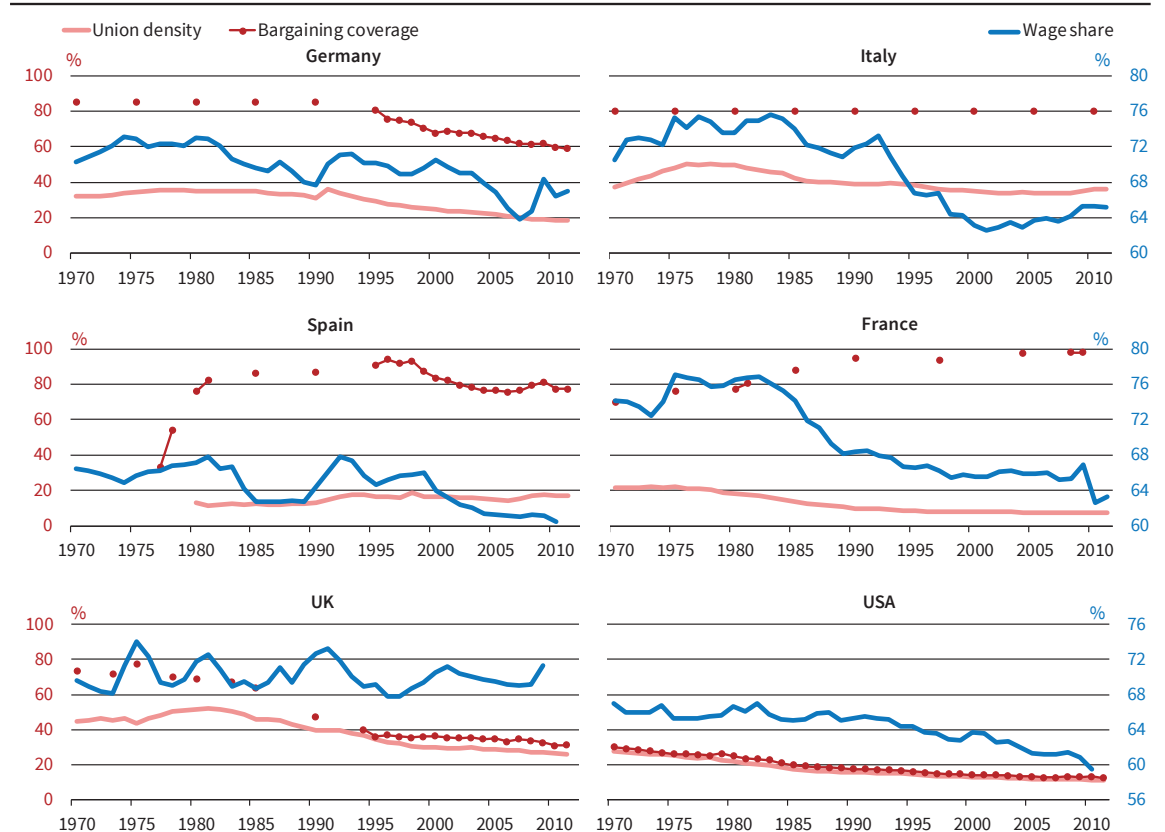
We observe a steady increase in the share of ICT capital to value added across all sectors and countries in our sample.⁷ There is a slight bias in favour of high skilled sectors in Britain and the United States, but the general positive and sometimes even exponential trend is common to all countries. In contrast, total capital intensity, while increasing in Germany, France, Italy and Spain, was largely stable in the United States and Britain.

The Bargaining Power Hypothesis

The bargaining power hypothesis attributes the decline in the wage share to a decline in the bargaining power of labour. If markets are not fully competitive, i.e. there is market power in the labour market and potentially the goods market, bargaining power between capital and labour determines factor income distribution (besides capital intensity and capital augmenting technological change). In models of bargaining power, capital and labour bargain for wages and potentially employment. Both parties have an interest in concluding the negotiations and the split of the value added depends on their respective fall-back options. The literature distinguishes three main factors determining bargaining power

⁷ Descriptive statistics are available upon request from the authors: see also Guschanski and Onaran (2016).

Figure 1
Changes in the Wage Share and Different Bargaining Regimes
1970–2011



Source: Visser (2015); EU KLEMS (Timmer *et al.* 2007).

© ifo Institute

– labour market institutions, financialisation and globalisation.

a) Labour Market Institutions

The traditional focus of bargaining power models are labour market institutions (Blanchard and Giavazzi 2003). Measures of bargaining power related to labour market institutions can be categorised into direct and indirect factors. Direct factors strengthen workers' voice in negotiations, whereas indirect factors improve their fall-back options in case negotiations break down. An example of indirect factors is unemployment benefits. A similar effect can be expected from welfare services provided by the state which allow workers to rely on the fall-back option of a social wage to meet their basic needs in case of losing their job (Stockhammer 2017; Onaran 2009; Jayadev 2007; Harrison 2002). Direct measures of bargaining power include union density, strike activity, collective bargaining arrangements and minimum wages. Different measures of direct bargaining power might be relevant depending on the bargaining regime. We differentiate regimes by their level of union density, collective bargaining coverage and by the degree of bargaining coordination, i.e. whether bargaining takes place at the firm, industry or national level. Table 2 provides a summary of the degree of coordination for our sample, while Figure 1 demonstrates the development of union density, collective bargaining coverage and the wage share.

Highly coordinated regimes where bargaining takes place at the industry or national level are usually characterised by a high degree of bargaining coverage. In such a setting, union density might be the most relevant variable for the determination of functional income distribution, as it captures the potential pressure unions can exert on employers (Visser 2006). If unions achieve their goals, agreements are implemented at the industry level. Examples include

Italy and Germany, which experienced a decline in union density while maintaining a relatively high level of collective bargaining coverage and a high degree of coordination. Union density stagnated or even increased in Spain between 1980 and 2010, however not exceeding the comparatively low level of 20 percent, while collective bargaining coverage remained high.⁸ In contrast, in decentralised regimes unions might be less effective in pushing labours' interests, because wage increases at the firm level are not automatically transferred to the wider work force.⁹ Britain and the United States are prime examples of such institutional settings. In these cases, collective bargaining coverage might be more relevant, as it captures the effectiveness of unions in pushing for higher wages and defending employment on a wider scale (i.e. industry or country level). France is a special case characterised by a high degree of bargaining coverage, coupled with a low level of union density and a low degree of coordination. In this context, small unions can be very effective in improving the wage share due to the high level of collective bargaining coverage. However, due to the low degree of coordination, unions might not be able to take potential negative employment effects into account. Therefore, it is not clear which variable is best suited to capture changes in bargaining power in France *a priori*.

Comparing the dynamics of these labour market institutions across countries reveals that union density measured at the country level decline most strongly in Britain and Germany where the reduction constitutes 24 and 18 percentage-points respectively. The most drastic reductions in bargaining coverage can be observed in Britain, Germany and the United States

⁸ Since the increasing trend of union density in Spain can be attributed to a period of recovery after oppressed labour unions after Franco, we regard it as a special case.

⁹ Conversely, it has been argued that a high degree of coordination allows wage suppression with potentially negative effects on the labour share (OECD 2012).

Table 2
The Degree of Coordination in Bargaining

		Degree of coordination	Hypothesis: most relevant measure of direct bargaining power
Germany	3	1964–65; 1968–77; 1998–2001	Union density
	4	1960–63; 1966–67; 1978–97; 2002–11	
France	2	1961–2011	Union density or bargaining coverage
	2	1987–2001	
Spain	3	2008–11	Union density
	4	1980–86; 2002–08	
Italy	2	1960–76; 1985–1991	Union density
	3	1992–2011	
	4	1977–84	
UK	1	1980–2011	Bargaining coverage
	3	1961–74	
US	4	1975–79	Bargaining coverage
	1	1960–2011	

Notes: Degree of coordination: 1 – Fragmented wage bargaining, confined largely to individual firms or plants; 2 – Mixed industry and firm-level bargaining, weak government coordination through MW setting or wage indexation; 3 – Negotiation guidelines based on centralized bargaining; 4 – Wage norms based on centralized bargaining by peak associations with or without government involvement; 5 – Maximum or minimum wage rates/increases based on centralized bargaining.

Source: Visser (2015).

where it declined by 48, 27 and 18 percentage-points between the 1970 and the 2010s.

Several empirical papers have confirmed an impact of direct measures of bargaining power, such as strike activity, collective bargaining arrangements and minimum wages on the wage share (Kristal 2010; Argitis and Pitelis 2001; Bentolila and Saint-Paul 2003; European Commission 2007; ILO 2011). Union density is the most commonly used variable with the best data availability and the most robust positive effect on the wage share in country level estimations (Stockhammer 2009 and 2017; ILO 2011). In contrast, IMF (2007 and 2017) and European Commission (2007) find no significant effect of union density in most specifications.

Among indirect measures of bargaining power, welfare state retrenchment is found to be an important determinant of the fall in the wage share (Harridon 2002; Jayadev 2007; Onaran 2009; Stockhammer 2017). However, the measure used is often aggregate government spending. Kristal (2010) uses government civilian spending, which nevertheless does not capture the details of spending that is particularly important for the social wage and bargaining power of labour such as in-kind benefits and cash transfers.

Social government expenditure, defined as government spending on market goods and services provided to households such as health care, housing, recreational and cultural services, education and social protection, can be used as a proxy for the social wage of workers. We observe an increase in social government spending in our sample period in most countries. However, the trend might be related to the fact this measure excludes social transfers in cash (reflecting welfare benefits), which are not available prior to 1995.¹⁰ Interestingly, while social government spending increased or stagnated, its financing is more reliant on workers' income as can be observed by the increasing implicit tax rates for labour and consumption for all countries in our sample (Onaran and Bösch 2014).

b) Financialisation

This paper addresses financialisation as an important determinant of bargaining power, which gained momentum since the 1980s and received only limited attention in the literature on functional income distribution. Financialisation is not unambiguously defined but can be understood as the “increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies” (Epstein 2005, 3). We outline three sub-channels *via* which financialisation can impact the wage share.

¹⁰ Social transfers were added to the previous measure for robustness tests, but unfortunately the latter series is available from 1995 only for most countries.

The first channel highlights that managers, motivated by shareholder value maximisation, adopted a corporate governance strategy that is hostile towards wage increases and prioritises dividend pay-outs and share buybacks (Lazonick 2014). Similarly, shareholder value orientation coincided with increasing financial payments, such as dividend payments to satisfy shareholders, or interest payments on debt (Hein 2015; Dünhaupt 2016). Rather than accepting profit cuts, managers shifted the burden of increased financial payments on consumers by increasing the mark-up on production costs, with negative impacts on the wage share. This argument has motivated four econometric studies that found a negative impact of dividend and interest payments on the wage share, although the effect of interest payments is less robust (Dünhaupt 2016; Guschanski and Onaran 2018; Hein and Schoder 2011; Kohler *et al.* 2018; Alvarez 2015).

The second channel highlights that fall-back options of capital increased due to the possibility to invest in financial assets rather than productive activities. This will lead to an increase in the relative bargaining power of capital. Lin and Tomaskovic-Devey (2013) and Alvarez (2015) investigate this hypothesis using US sector-level and French firm-level data respectively. Both find a negative effect of financial income on the wage share, while controlling for variables measuring technological change and globalisation. In contrast, Kohler *et al.* (2018) find no effect of financial income in a panel of 14 OECD countries. Several studies based on country-level data find a negative effect of financial globalisation on the labour share, which can be considered an alternative measure of this variable (Jayadev 2007; Stockhammer 2009 and 2017; ILO 2011).

The third channel emphasises household indebtedness. Household debt has been argued to reduce the wage share through increasing financial vulnerability that has an adverse effect on workers' willingness to engage in collective action (Anderloni *et al.* 2012; Kohler *et al.* 2018; Wood 2017). Wood (2017) finds a negative effect of mortgage debt in Britain and the United States for the period 1979–2012.

To test these three channels, we employ three measures of financialisation: financial payments (the sum of interest and dividend payments) and financial income of nonfinancial corporations as a ratio to total resources of nonfinancial corporations obtained from the OECD Non-financial Accounts by Sectors Database. Furthermore, we augment our analysis by a measure of household debt as a percentage of GDP from the Bank of International Settlements Total Credit Statistics. All measures show an overall increasing trend in the 2000s,¹¹ which is interrupted only by the Great

¹¹ Household debt has been increasing in our sample since the 1970s. For other variables availability data starts in the late 1990s or early 2000s.

Recession, after which most measures decline until 2011.

Globalisation

Globalisation plays a dual role – on the one hand it increases the bargaining power of capital due to increased mobility and ease of offshoring or relocation, on the other hand it can lead to changes in capital intensity or induce technological change. The increase in capital intensity will be driven by globalisation if firms in capital abundant countries offshore labour-intensive tasks to benefit from lower wages in labour abundant countries (IMF 2017; Elsby *et al.* 2013). This mechanism should be reflected in changes in capital intensity – consequently, it is not possible to identify whether the effect of capital intensity stems from technological change or globalisation. In contrast, trade induced capital-augmenting technological change as well as changes in bargaining power due to globalisation will change the wage share for a given level of capital intensity. Therefore, technology and bargaining power effect of globalisation cannot be separated in our empirical framework.

Two tendencies characterising advanced economies in the past decades were the increase in offshoring and FDI. We expect a negative effect of offshoring on the within-industry wage share for low skilled sectors in advanced economies, brought about either by downward pressure on wages to maintain competitiveness or through trade-induced labour-saving technological change (Grossman and Rossi-Hansberg 2006; Onaran 2011). The expected effect for high skilled sectors is more ambiguous, given that imports can also increase output and consequently labour demand and wages if they are complementary to domestic production or reduce costs. The effect is theoretically even more ambiguous if one considers imports of final goods that are not produced domestically (Onaran 2011).

We generally expect the effect of outward FDI to vary across manufacturing and services and potentially across skill groups. FDI is generally classified into two categories: vertical or cost-seeking FDI induces downward pressure on wages as it puts domestic workers in direct competition with foreign workers (Choi 2001). Additionally, cost-seeking FDI might have an impact on the factor composition since the type of jobs created abroad are potentially of a low skilled nature, whereas high-skilled jobs might be created domestically. This can lower wages of low-skilled domestic workers while increasing those of high-skilled workers. The effect of horizontal, or market-seeking FDI on the wage share is less clear. Most likely it will have a positive impact for high skilled workers because of an increase in labour demand at headquarters situated in the home country (Onaran 2012). Generally, we expect these effects to be less pronounced in services because of their non-tradable character. Whether market or

cost-seeking FDI dominates in a particular country or industry remains an empirical question. Herger and McCorriston (2014) rely on firm-level data to show that the share of vertical FDI is between 26–30 percent of all FDI in France, Germany, Britain and the United States. The lowest share of vertical FDI can be found in Britain and France (26 percent), while the highest share is in the United States (30 percent).¹² Depending on the industries affected, the impact of FDI on the wage share might therefore differ by country.

Several empirical studies find substantial negative effects of variables measuring trade intensity (imports plus exports as a ratio to GDP), foreign direct investment (FDI) or offshoring, in line with the hypothesis that trade liberalisation increases the fall-back options of capital (Harrison 2002; European Commission 2007; IMF 2007; Jayadev 2007; Dünhaupt 2016; Stockhammer 2017). Research using sector level data finds negative effects of import penetration in high wage countries, while there are mixed results for FDI (Bassanini and Manfredi 2014; IMF 2017; Lin and Tomaskovic-Devey 2013; Onaran 2011 and 2012).

Variables accounting for globalisation show a similar pattern across all countries of our sample. Intermediate import penetration increased in all countries in both high and low skilled manufacturing sectors. The years of the crisis and shortly afterwards are the only exception to the otherwise increasing trend, which resumed at the latest in 2010 in all countries.¹³ The highest total growth rate was achieved in the 1990s in Germany, driven by high skilled manufacturing sectors, which in general have a higher level of intermediate imports than low skilled manufacturing sectors. A similar pattern can be observed for outward FDI. Outward FDI per employee increased more in high-skilled manufacturing and service sectors rather than their low-skilled counterparts in France, Germany and the United States, while the other countries experienced a rather balanced increase in outward FDI across sectors. The exceptions are low-skilled service sectors, which experience the least amount of outward FDI in all countries.

While offshoring and FDI capture the increasing mobility of capital, migration allows us to account for the mobility of labour. Previous findings suggest the effect of migration on the wage share to be negligible (IMF 2007). Theoretically, the effect depends on whether migrant labour both substitutes the domestic workers and pushes down wages or acts as a complement to labour being performed locally, rather than a direct competitor. Previous research has shown that migration is related to increased innovation, measured by the registration of patents, and is therefore potentially positively linked to productivity, with the subsequent effects discussed above (see Hunt and Gauthier-Loiselle 2010, for the United States;

¹² They do not report data for Spain and Italy.

¹³ These years are the reason why several countries have a negative growth rate for the last period.

and Rolfe *et al.* 2013, for Britain; in general results appear to be country specific). Turning to the effect on employment, migrants often bring in knowledge about markets and economies of their home countries and therefore open the possibility for expansion of the business activities *via* new export markets, which might have a positive impact on the wage share (Huber *et al.* 2010; Rolfe *et al.* 2013). Conversely, if unions and other institutions protecting labour rights are weak and migrants are paid lower wages than nationals, the impact on the wage share will be negative.

The share of migrant workers in the total labour force has been increasing in most countries with the noticeable exception of France where it declined. Nevertheless, the share of migrants is very small in all countries, exceeding ten percent only the United States, where the data is not comparable because it is measured as foreign-born rather than foreign labour force.

MODEL AND ESTIMATION METHOD

Our basic estimation equation has the following form:

$$(1) \quad WS_{i,t} = \alpha_i + \alpha_g GROWTH_{i,t} + \alpha_k KnonICT_{i,t} + \alpha_{kict} KICT_{i,t} + \alpha_{LMI} LMI_{i,t} + \alpha_{glob} GLOBAL_{i,t} + \alpha_{welfare} WELFARE_t + \alpha_{financial} FINANCIALISATION_t + \varepsilon_{i,t}$$

where i is the sector index and t is the time index. These estimations are conducted for each country separately. WS is the wage share in sector i from the EU KLEMS database (Timmer *et al.* 2007).¹⁴ Income of self-employed workers is imputed based on the assumption that their wage is equal to the average hourly wage of the sector. $GROWTH$ is the growth of the value added of the sector. It is included to control for the counter-cyclical dynamics of the wage share due to the existence of overhead costs. $KICT$ and $KnonICT$ are ICT (information and communication technology) and non-ICT capital services as a ratio to value added; these capture the effects of technological change. $GLOBAL$ stands for intermediate import penetration (capturing offshoring¹⁵), outward FDI intensity¹⁶ and the share of migrant workers in total employment. LMI captures different labour market institutions

¹⁴ Further information on data sources is available upon request from the authors.

¹⁵ However, our data for intermediate imports is based on the conversion of commodity indices to sector indices and thereby does not allow us to calculate how much of the imported product is actually used by each sector, which requires the use of Input-Output tables (Guschanski and Onaran 2017). However, if the use of imported goods stays relatively constant across sectors, intermediate import penetration is a relevant measure for the reallocation of production abroad.

¹⁶ We focus on outward FDI since it is clearly linked to developments in the wage share while the effect of inward FDI is more ambiguous, and less relevant for developed economies. Furthermore, estimations with inward FDI did not change our results for outward FDI and the coefficient was not robust. Furthermore, we test the robustness of our results with regard to globalisation with country-level variables like the KOF index supplied by Dreher (2006) and Dreher *et al.* (2008). These controls, which are important because the variable constitutes an exogenous measure of globalisation, strongly confirm our results with sector level variables. Results available upon request.

including union density (at the sector level) and adjusted collective bargaining coverage at the country level. $FINANCIALISATION$ includes interest and dividend payments and income as a ratio to total resources of nonfinancial corporations, as well as household debt as a ratio to GDP at the country level. $WELFARE$ is social government expenditure measured at the country level. α_i is a sector specific coefficient. We do not include period effects in our baseline estimation since several of our bargaining variables are only available at the country level and are thereby statistically similar to year dummies while carrying more meaningful information.

We apply two main estimation techniques. Our baseline estimation is performed using the within estimator, while we estimate the variance-covariance-matrix of the remainder error term using the approach developed by Driscoll and Kraay (1998). Therefore, standard errors are robust with respect to serial correlation within countries, cross-sectional correlation between countries as well as general heteroscedasticity. Our main robustness test is conducted using the first difference estimator. This has the additional advantage that potential non-stationarity concerns are taken care of given that all our variables are unambiguously stationary in first differences. Since there is reason for concerns regarding the endogeneity for our measures of globalisation, and because the effect of other variables will most likely be manifested with a time lag, all explanatory variables enter the equation with a lag. It would be preferable to employ a General Method of Moments (GMM) estimator to tackle the issue of endogeneity as well as the dynamic nature of distribution. However, due to the limited number of cross sections in our single country estimations this estimation method is not appropriate (Roodman 2009). Including our explanatory variables with a lag to mitigate biases arising from sequential exogeneity (predetermined variables) can be seen as a 'second best approach' given our dataset (Wooldridge 2002).

In addition to the pool of all sectors, separate regression analyses are performed for sector groups disaggregated as high skilled and low skilled sectors in manufacturing and services separately. This not only allows us to test the robustness of our results, but at the same time provides insights with regards to the variables that have potentially contrasting effects for manufacturing and services or across skill groups. However, since our cross sections are limited to a maximum of 21 sectors, specifications for individual skill groups can only provide indicative evidence.¹⁷ We exclude the Agriculture, Hunting, Forestry and Fishing, and Mining and Quarrying sectors as well as mostly publicly owned sectors (Public Administration and Defence; Compulsory Social Security; Education; Human Health and Social Work Activities) from the

¹⁷ The sectoral classification is based on the International Standard Industrial Classification of All Economic Activities (ISIC 3).

reported estimations, as in these sectors wage setting behaviour may constitute an outlier and may not be determined by the same forces as other sectors.

The estimation period differs due to data availability depending on the variables used in each specification and country. While the data for the wage share at a sectoral level is available for 1970–2011, the data for the FDI starts only in 1985 and detailed data on imports disaggregated as intermediate and final imports start in 1995. The estimation period for most countries for the specifications including intermediate import penetration is 1996–2010, while it is 1986–2010 for specifications including FDI. Furthermore, data for our measures of financialisation starts in 1995 for most countries with the exception of France where data is available from 1970.

ESTIMATION RESULTS

Table 3 presents a summary of our estimation results, while country-specific estimations are available upon request from the authors (see also Guschanski and Onaran 2016). The results reported in Table 3 provide a summary of over 40 different specifications for each variable, as we conduct separate specifications by skill-group, manufacturing and service industries, as well as two different estimations methods (within- and first-difference estimator). Therefore, they can only be seen as indicative.

Technology

We do not find a significant negative effect of ICT capital services on the wage share in France except for one specification when estimated using the within estimator only. The effect of ICT capital is even less robust for Germany where the variable is found to be positive or statistically insignificant in basically all specifications. The same applies to non-ICT capital

services that exhibit a robust positive effect for the manufacturing sector pool. Similarly, capital intensity appears to be insignificant for most of the specifications for Britain ICT capital intensity appears to have a negative impact on the wage share in the United States, Italy and Spain. However, using sectors defined as high or low-skilled we fail to find evidence for the hypothesis that technological change will decrease the wage share of low-skilled labour and increase the wage share of high-skilled labour. Furthermore, in the United States and Spain the coefficient for ICT is statistically not different from zero when we include variables accounting for the effect of financialisation and migration. On the other hand, we find a robust positive impact of non-ICT capital in the United States, Italy and Spain, implying an elasticity of substitution that is smaller than one, which is in contrast to the finding for ICT capital intensity.

Bargaining Power

Our results regarding measures of bargaining power differ significantly across countries. We find robust positive effects of union density in Germany, mainly driven by the manufacturing sector. This is not surprising given the long tradition of sector-level wage negotiations in Germany. Similarly, we obtain a positive impact of union density in Italy and Spain. In France there is no robust effect of union density, and in fact the variable seems to have a perverse negative effect in some of the specifications using the within estimator. However, when we replace union density by adjusted collective bargaining coverage, we obtain a robust positive effect. Similarly, we obtain an insignificant coefficient for union density in Britain and the United States, while bargaining coverage appears to have a positive effect especially for manufacturing sectors in Britain and manufacturing as well as service sectors in the United States.

Table 3

Summary of Estimation Results

	Germany	France	Spain	Italy	UK	US
Technology						
ICT	0	0	–*	–	0	–
non-ICT	+	0	+	+	0	+
Globalisation						
intermediate import penetration	–	–	+*	0	0	–
FDI	–*	0	–	0	0	0
Migration	–*	0	0	+*	+	0
Labour market institutions and social government expenditure						
Union density	+	0	+	+	0	0
Bargaining coverage	+	+	+	+	+	+
Government expenditure	0	+	0	+	+	+*
Financialisation						
Household debt	0	+	0	+*	–	–
Financial payments	0	+*	–*	0	–	–
Financial income	–	–*	0	0	+	–

Notes: Table 3 provides a summary of country-specific estimation results based on industry level data. '+' indicates a statistically significant positive impact of the variable in column 1 on the wage share. '-' indicates a statistically significant negative impact. '0' indicates no statistically significant effect. The signs provide a summary of over 40 different specifications for each variable, therefore they can only be seen as indicative. '**' indicates results that are robust only for a subset of the estimations, e.g. only for one particular estimation method or industry group.

Source: Guschanski and Onaran (2016); all estimation results are available upon request from the authors.

Social government spending has a statistically highly significant and robust positive coefficient for nearly all specifications in France and Italy, and is robust to the application of different estimation methodologies. The same holds for Britain although the results are not robust to estimations in first differences, and the United States where we find a positive impact if we reduce our sample to manufacturing sectors only, while we obtain a perverse negative sign for service sectors. For Germany and Spain, the effect is not robust to the application of different estimation methodologies and the coefficient is mostly statistically insignificant.¹⁸

We obtain mixed results regarding the effect of financialisation. In France household debt and financial payments have a perverse positive coefficient, while financial income has a negative effect. However, financial income and payments become insignificant for estimations in first differences. Similarly, we find a positive effect of household debt in Italy which is not robust to estimations in first differences. In Germany financial income appears to have the strongest negative effect on the wage share, while the negative coefficient of household debt is not robust. Similarly, we obtain a negative impact of financial payments in Spain, albeit only for estimations when applying the within estimator. However, in Britain, given the strong financial sector and the massive surge in household debt, financial payments and household debt both have a robust negative effect in all estimations using the within estimator, and the effect of financial payments is also robust when estimated in first differences. All financialisation variables have a negative impact on the wage share in the United States if the first difference estimator is applied.

Globalisation

We find support for a negative effect of globalisation measured by intermediate import penetration in France, Germany and the United States, while in Britain the coefficient is still negative but rarely significant. In the United States and France, the negative effect of intermediate import penetration is mostly driven by low-skilled manufacturing sectors, while in Germany the effect is equally found in low as well as high skilled manufacturing sectors. However, it is not robust to estimations in first differences in the United States and Germany. We find a positive impact of intermediate import penetration in some specifications in Spain using the first difference estimator, although this result is not robust to estimations using the first-difference estimator and other robustness tests.

¹⁸ We have also experimented with an alternative measure of government spending: total social government spending comprising the sum of in-kind and in-cash social transfers as a ratio to GDP. Our results are largely robust to this alternative measure but given that data for cash benefits is available only from 1995 onwards we prefer our current measure comprising in-kind transfers only.

In France we obtain an insignificant effect of outward FDI in the pool with all sectors when the first difference estimator is used, however the effect is positive for manufacturing sectors and negative for service sectors (albeit insignificant).¹⁹ Similarly, there is no robust effect of outward FDI in first differences in Britain. This is in line with research by Herger and McCorrison (2014) suggesting a low share of vertical FDI in Britain and France. For Germany the impact of FDI does not appear to be robust for the pool of all sectors. However, the effect is negative and highly significant and doubles in size when we restrict our sample to manufacturing sectors only (first difference estimator), while it stays insignificant, albeit with a positive sign, if only service sectors are considered. Interestingly, we find a positive impact of outward FDI in the United States using the within estimator, driven by high-skilled manufacturing and service sectors alike, while the effect is negative for low skilled service sectors. However, the coefficient turns insignificant if the first difference estimator is applied. Furthermore, we obtain a highly robust negative impact of outward FDI in Spain. The impact of outward FDI turns out to be mostly statistically insignificant or not robust in Italy, especially applying the first difference estimator.

Our country-level measure of migration has a positive effect in Britain, which points to the fact that migrant workers are overall complementary to domestic workers, while there is a negative effect in Germany. However, the negative effect in Germany is not robust in all specifications, and according to the estimations in first differences, the negative migration effect seems to be driven by low skilled manufacturing sectors. In France, the effect of migration is insignificant in the total pool but is significantly positive in services; further disaggregation indicates that the positive effect in services is driven by high skilled services, whereas there is a negative effect in the low skilled manufacturing sectors. Turning to the other countries we find a positive effect of migration in Italy, clearly driven by manufacturing sectors, while there is no statistically significant effect in the United States or Spain.

CONCLUSION

Our results provide evidence for the importance of country specific estimations. Our findings cast doubt on the technological change hypothesis as an explanation for the decline in the wage share common to all countries. While we found some evidence for a negative impact of ICT-capital intensity in the United States, Italy and Spain, the finding of a positive effect of non-ICT capital in these countries cast doubt on the prevalence of an elasticity of substitution larger than

¹⁹ Our measure of FDI is the variable for which we are most concerned about non-stationarity as our unit root test indicate integration of first order. Therefore, we mainly rely on the estimations in first differences for the analysis of outward FDI. For estimations using the within estimator we obtain a positive impact in France.

one, which is a necessary condition for the technological change hypothesis. These doubts are substantiated by our finding that the effect of ICT capital intensity does not differ across high- and low-skilled sectors. Other countries show no robust effect of technological change on the wage share. This suggests that the effect of technology might be determined by the institutional environment in which production takes place, rather than by the elasticity of substitution.

The relevance of the institutional environment is further emphasised by our findings with respect to different measures of bargaining power. We confirm our hypothesis that union density is an important indicator of the bargaining power of labour in highly coordinated regimes (Germany, Italy and Spain), while collective bargaining coverage is more important in countries where firm-level bargaining dominates (France, the United States and Britain). This hypothesis can also be translated into an argument about different forms of bargaining power. The industrial relations literature relates the degree of coordination and bargaining coverage to the 'institutional power' of unions, while union density and fall-back options relate to 'organisational and structural power' (Wright 2000; Silver 2003; Brinkmann and Nachtwey 2010; Bispinck *et al.* 2010). Our finding of an insignificant effect of union density in Britain, the United States and France implies that organisational power (union density) does not have an impact on the wage share unless it is backed up by institutional power as represented by a sufficient degree of coordination and bargaining coverage. With respect to other measures of bargaining power we find a positive impact of social government spending in France and Italy, and, less robust, for Britain and the United States, while there is no significant effect in Germany and Spain. This is in line with our finding that countries with a decentralised bargaining regime will benefit from policies at the national level, since gains that unions can achieve are often confined to a small work force.

Financialisation had the most pronounced effect in Britain and the United States, while there is also an effect in Germany. In Britain the most relevant channel appears to be shareholder value orientation that leads to wage suppression or increases in the mark up on production costs, as well as household indebtedness that reduces labour's bargaining power. In Germany, and to some extent in France, increasing fall-back options of capital as captured by financial income appear to have a negative impact on the wage share. In the United States all three aspects of financialisation appear to be relevant. Estimations for other countries are inconclusive and require analysis using data on a more disaggregated level (Guschanski and Onaran 2018).

We find that globalisation had a strong impact on the wage share in all countries. The effect of globalisation on the wage share was least strong in

Britain, which might indicate that market seeking rather than cost seeking FDI dominates in this country. In Germany the effect is due to outward FDI as well as intermediate import penetration which reflects the impact of international outsourcing practices and suggest that cost-seeking trade activities dominate. Intermediate imports penetration, had a positive (but not robust) impact in Spain, while FDI had a robust negative impact. FDI played a smaller role in France and the United States, while import penetration had a negative effect on the wage share in these countries.

Overall, our findings suggest that the decline in the wage share is not an inevitable outcome of technological change and globalisation. The lack of robustness regarding the effects of technology implies that an attempt to reduce income inequality through skill-upgrading alone will not be sufficient. Reversing the decline in the wage share requires an institutional framework in which the bargaining power of labour is more in balance with that of capital. Our findings suggest that it might not be enough to increase union density to achieve such a 'level playing field'. Rather it requires a policy mix aiming at increasing the institutional power of unions *via* higher bargaining coverage and, potentially, coordination, as well as increasing the structural power of labour by improving labour's fall-back options. This is particularly relevant for countries where firm-level bargaining dominates (Britain, the United States and to some extent France). The effect of financialisation can be altered by creating incentives to decrease short termism and dividend payments, e.g. through higher taxation of dividend payments and capital gains, and by prohibiting share buybacks. Decoupling executives' remuneration from share prices and including representatives of employees and the wider public on company boards would further support this process (Lazonick 2014).

REFERENCES

- Alvarez, I. (2015), "Financialization, Non-financial Corporations and Income Inequality: The Case of France", *Socio-Economic Review* 13, 449–475.
- Anderloni, L., E. Bacchiocchi and D. Vadone (2012), "Household Financial Vulnerability: An Empirical Assessment", *Research in Economics* 66, 284–296.
- Argitis, G. and C. Pitelis (2001), "Monetary Policy and the Distribution of Income: Evidence for the United States and the United Kingdom", *Journal of Post Keynesian Economics* 23, 617–638.
- Bassanini, A. and T. Manfredi (2014), "Capital's Grabbing Hand? A Cross-industry Analysis of the Decline of the Labor Share in OECD Countries", *Eurasian Business Review* 4, 3–30.
- Bentolila, S. and G. Saint-Paul (2003), "Explaining Movements in the Labor Share", *The B.E. Journal of Macroeconomics* 3, 1–33.
- Bispinck, R., H. Dribbusch and T. Schulten (2010), *German Collective Bargaining in a European Perspective: Continuous Erosion or Re-stabilisation of Multiemployer Agreements?*, WSI-Diskussionspapier 171.
- Blanchard, O. and F. Giavazzi (2003), "Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets", *The Quarterly Journal of Economics* 118, 879–907.
- Brinkmann, U. and O. Nachtwey (2010), "Krise und strategische Neuorientierung der Gewerkschaften", *Aus Politik und Zeitgeschichte* 13–14, 21–29.

- Carey, D. and H. Tchilinguirian (2000), *Average Effective Tax Rates on Capital, Labour and Consumption*, OECD Economics Department Working Paper 258.
- Chirinko, R.S. (2008), "α: The Long and Short of It", *Journal of Macroeconomics* 30, 671–686.
- Chirinko, R.S. and D. Mallick (2014), *The Substitution Elasticity, Factor Shares, Long-run Growth, and the Low-frequency Panel Model*, CESifo Working Paper 4895.
- Choi, M. (2001), Threat Effect of Foreign Direct Investment on Labour Union Wage Premium, *PERI Working Paper* 27.
- Dreher, A. (2006), "Does Globalization Affect Growth? Empirical Evidence from a New Index", *Applied Economics* 38, 1091–1110.
- Dreher, A., N. Gaston and P. Martens (2008), *Measuring Globalization – Gauging Its Consequence*, New York: Springer.
- Driscoll, J. and A. Kraay (1998), "Consistent Covariance Matrix Estimation with Spatially Dependent Data", *The Review of Economics and Statistics* 80, 549–560.
- Dünhaupt, P. (2016), "Determinants of Labour's Income Share in the Era of Financialisation", *Cambridge Journal of Economics* 41, 283–306.
- Ebbinghaus, B. and J. Visser (2000), *The Societies of Europe - Trade Unions in Western Europe since 1945*, London: Macmillan.
- Elsby, M.W., B. Hobbijn and A. Sahin (2013), *The Decline of the U.S. Labor Share*, Federal Reserve Bank of San Francisco Working Paper 27.
- Epstein, G.A. (2005), *Financialization and the World Economy*, Cheltenham: Edward Elgar.
- European Commission (2007), "The Labour Income Share in the European Union", *Employment in Europe*, Brussels: European Commission, 237–272.
- Grossman, G.M. and E. Rossi-Hansberg (2006), *Trading Tasks: A Simple Theory of Offshoring*, NBER Working Paper 12721.
- Guschanski, A. and Ö. Onaran (2016), *Determinants of the Wage Share: A Cross-country Comparison Using Sectoral Data*, Greenwich Paper in Political Economy, University of Greenwich, #GPERC41.
- Guschanski, A. and Ö. Onaran (2017a), *The Political Economy of Income Distribution: Industry Level Evidence from 14 OECD Countries*, Greenwich Papers in Political Economy, University of Greenwich, #GPERC51.
- Guschanski, A. and Ö. Onaran (2017b), *Why Is the Wage Share Falling in Emerging Economies? Industry Level Evidence*, Greenwich Papers in Political Economy, University of Greenwich, #GPERC52.
- Guschanski, A. and Ö. Onaran (2018), *The Labour Share and Financialisation: Evidence from Publicly Listed Firms*, Greenwich Papers in Political Economy, University of Greenwich, #GPERC59.
- Harrison, A.E. (2002), *Has Globalisation Eroded Labour's Share? Some Cross-country Evidence*, UC Berkeley, mimeo.
- Hein, E. (2015), "Finance-dominated Capitalism and Re-distribution of Income: A Kaleckian Perspective", *Cambridge Journal of Economics* 39, 907–934.
- Hein, E. and C. Schoder (2011), "Interest Rates, Distribution and Capital Accumulation – A Post-Kaleckian Perspective on the US and Germany", *International Review of Applied Economics* 25, 693–723.
- Herger, N. and S. McCorriston (2014), *Horizontal, Vertical, and Conglomerate FDI: Evidence from Cross Border Acquisitions*, Swiss National Bank Study Center Gerzensee Working Paper 14.02.
- Huber, P., M. Landesmann, C. Robinson, R. Stehrer, R. Hierländer, A. Iara, M. O'Mahony, K. Nowotny and F. Peng, (2010), *Migration, Skills and Productivity*, The Vienna Institute for International Economic Research Studies, Research Reports 365.
- Hunt, J. and M. Gauthier-Loiselle (2010), "How Much Does Immigration Boost Innovation?", *American Economic Journal: Macroeconomics* 2, 31–56.
- ILO (2011), "The Labour Share of Income: Determinants and Potential Contribution to Exiting the Financial Crisis", *ILO World of Work Report: Making Markets Work for Jobs*, Geneva, Chapter 3.
- IMF (2007), "The Globalization of Labor", *World Economics Outlook April 2007*, Washington DC, Chapter 5.
- IMF (2017), "Understanding the Downward Trend in Labor Income Shares", *World Economic Outlook: Gaining Momentum?*, Washington DC, 121–172.
- Jayadev, A. (2007), "Capital Account Openness and the Labour Share of Income", *Cambridge Journal of Economics* 31, 423–443.
- Karabarbounis, L. and B. Neiman (2014), "The Global Decline in the Labor Share", *The Quarterly Journal of Economics* 129, 61–103.
- Kohler, K., A. Guschanski and E. Stockhammer (2018), *The Impact of Financialisation on the Wage Share: A Theoretical Clarification and Empirical Test*, Post-Keynesian Economics Study Group Working Paper 1802.
- Kristal, T. (2010), "Good Times, Bad Times: Postwar Labor's Share of National Income in Capitalist Democracies", *American Sociological Review* 75, 729–763.
- Lavoie, M. (2014), *Post-Keynesian Economic: New Foundations*, Cheltenham: Edward Elgar.
- Lazonick, W. (2014), "Profits without Prosperity", *Harvard Business Review* September.
- Lazonick, W. and M. O'Sullivan (2000), "Maximizing Shareholder Value: A New Ideology for Corporate Governance", *Economy and Society* 29, 13–35.
- Lin, K.H. and D. Tomaskovic-Devey (2013), "Financialization and U.S. Income Inequality, 1970–2008", *American Journal of Sociology* 118, 1284–1329.
- OECD (2012), *OECD Employment Outlook 2012*, Paris.
- OECD (2016), *Foreign Direct Investment (FDI) Statistics – OECD Data, Analysis and Forecasts*, <https://www.oecd.org/daf/inv/FDI-statistics-explanatory-notes.pdf>.
- Onaran, Ö. (2009), "Wage Share, Globalization, and Crisis: The Case of Manufacturing Industry in Korea, Mexico, and Turkey", *International Review of Applied Economics* 23, 113–134.
- Onaran, Ö. (2011), "The Effect of Import Penetration on Labor Market Outcomes in Austrian Manufacturing Industry", *The International Trade Journal* 25, 163–204.
- Onaran, Ö. (2012), "The Effect of Foreign Affiliate Employment on Wages, Employment, and the Wage Share in Austria", *Review of Political Economy* 24, 251–271.
- Onaran, Ö. and V. Bösch (2014), "The Effect of Globalization on the Distribution of Taxes and Social Expenditures in Europe: Do Welfare State Regimes Matter?", *Environment and Planning A* 46, 373–397.
- Rolfe, H., C. Rienzo, M. Lalani and J. Portes (2013), *Migration and Productivity: Employers' Practices, Public Attitudes and Statistical Evidence*, Report for the National Institute of Economic and Social Research.
- Roodman, D. (2009), "How to Do xtabond2: An Introduction to Difference and System GMM in Stata", *The Stata Journal* 9, 86–136.
- Rowthorn, R. (2014), *A Note on Thomas Piketty's Capital in the Twenty-First Century*, http://tcf.org/assets/downloads/A_Note_on_Thomas_Piketty3.pdf.
- Silver, B. (2003), *Forces of Labour*, Cambridge: Cambridge University Press.
- Stockhammer, E. (2009), *Determinants of Functional Income Distribution in OECD Countries*, IMK Studies 5.
- Stockhammer, E. (2017), "Determinants of the Wage Share: A Panel Analysis of Advanced and Developing Economies", *British Journal of Industrial Relations* 55, 3–33.
- Timmer, M., T. van Moergastel, E. Stuivewold, G. Ypma, M. O'Mahony and M. Kangasniemi (2007), *EU KLEMS Methodology*, http://www.euklems.net/data/EUKLEMS_Growth_and_Productivity_Accounts_Part_I_Methodology.pdf.
- Visser, J. (2006), "Union Membership Statistics in 24 Countries", *Monthly Labor Review* January, 38–49.
- Visser, J. (2015), *ICTWSS: Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts in 34 Countries between 1960 and 2007*, <http://www.uva-aias.net/208>.
- Wood, J.D.G. (2017), "The Effects of the Distribution of Mortgage Credit on the Wage Share: Varieties of Residential Capitalism Compared", *Comparative European Politics* 15, 819–847.
- Wooldridge, J.M. (2002), *Econometric Analysis of Cross Section and Panel Data*, Cambridge MA: The MIT Press.
- Wright, E.O. (2000), "Working Class Power, Capitalist Interests, and Class Compromise", *American Journal of Sociology* 105, 957–1002.

Assaf Razin

Israel's Globalization Episodes: Lessons for Open Economies

INTRODUCTION AND SCOPE

Anti-globalization sentiment is growing, especially in Europe and the United States, with the increasingly integrated global economy blamed for domestic economic distress. Razin (2018) shows that Israel offers a counterexample to this view, by demonstrating the decisively positive economic effects of globalized finance, trade and immigration. Israel has seen a remarkable development, emerging from a low-income, high-inflation developing economy in the 1970s to a medium to high-income advanced economy in the 2000s, while becoming increasingly integrated into the world economy in trade, supply chains and through financial links. At the same time, the global economy has been buffeted by several unprecedented economic events over the past four decades. This article attempts to provide a brief analysis of the impact of these events on Israel's development, institutions and economic policies.

Globalization is currently facing some challenging political tests that are tougher than in previous decades. Migration is the core of the emerging trend towards economic nationalism. Sachs (2017) puts it succinctly when he says, "if people were told that they could move, no questions asked, probably a billion would shift around the planet within five years, with many coming to Europe and the US. No society would tolerate even a fraction of that flow. Any politician who says, 'let's be generous', without saying 'we're not going to let the doors stand wide open' will lose".¹ Rational and generous policy that also resonates politically will not eliminate national borders altogether. Instead, it will elicit calls for limits on the flow of migrants. The core of the wall-building coalition in the United States consists of white males with low educational attainment. Low-income citizens were also far more likely to support Brexit in Britain. The call for a 'points-based' immigration system from the Brexit campaign was an explicit call to increase the skill composition of UK immigrants. Israel's Law

of Return not only enables free immigration, but also grants returnees immediate citizenship. For a researcher, it is like a laboratory experiment on how free migration can function without non-economic forces and anti-migration sentiments. Brexit may have been a leading indicator of anti-globalization and rising economic nationalism. Continental Europe has not followed through to date. There is still the looming problem of settling the Middle East in the EU.

The political backlash against trade treaties in the United States has postponed multilateral trade agreements like the Transatlantic Trade and Investment Partnership (a US-EU trade deal), the Trans-Pacific Partnership (a US-Asia trade deal), and many others. The open-border model, which governed the global economy for over seventy years, is under threat. However, the acceleration of finance, technology and telecommunication and global supply chains makes the reversal from globalization self-defeating. Against this background, it is desirable to bring to the fore how Israel has been able to advance the political-economy process of globalization, notwithstanding domestic and external crises. Israel's globalization story provides a counterexample to the current trends.

Several unprecedented economic episodes have buffeted the global economy the past few decades. These episodes have had transforming effects on Israel's economy: the collapse of the Soviet Union, and the massive wave of high-skill immigration to Israel that followed; the Great Moderation in inflation and decreased employment fluctuations in advanced economies, which helped open emerging economies to converge to world inflation rates; the 2008 global financial crisis, whose epicentre was in the United States, but which spread violently to Europe; the rise of the Asian markets as export targets and as new origins for outward foreign direct investment (FDI); and the global information technology surge and its spill-overs, reinforced by FDI. The brain drain of top talents has also been encouraged, enabled by the pro-skill immigration rules in advanced countries on the demand side; and facilitated by Israel's highly advanced higher education system on the supply side. The Great Moderation in advanced economies occurred from 1985 to 2007, during the low-inflation era when the US Federal Reserve and other advanced economies' central banks provided a broadly stable macroeconomic environment to facilitate rational private-sector choice.

THE HYPER INFLATION CRISIS

The political upheaval in 1977, the so-called *Maapach*, was a game changer for economic policy in Israel. The newly elected government abruptly switched away from a long-running economic regime, which had been able to maintain fiscal discipline in the presence



Assaf Razin
Tel Aviv University

¹ See <http://politicalcritique.org/world/2017/new-abnormal-conversation-sachs-sierakowski/>.

of strong external shocks (the Yom Kippur War and the first oil crisis). Monetary policy was moderately accommodative, underpinned by a fixed exchange rate regime and shielded from capital flights by capital controls. Notwithstanding the oil price shock, inflation was in the low double digits.

In the first phase after their policies are enacted, populists tend to be vindicated. Growth and wages do indeed rise, as a combination of profligate spending and intrusive government control does expand the economy. Surging government spending and mandated wage hikes tend to produce a temporary 'sugar high', followed by a crash. Populist policies, because they are unsustainable, encourage people to shift their spending away from an uncertain future to the present, when the economy is temporarily booming. Beneath the surface, however, the country's economic potential deteriorates and financial disorders start to emerge. Rather than make the hard choice of returning to principled economic oversight, the populist leader recommits to harmful policies and steers the country toward decline, capital flight and sometimes debt crises. In all cases, there are disastrous effects for those groups who were supposed to be the beneficiaries of the populist policies.

CURBING INFLATION

Israel avidly globalized during this period, and its inflation decelerated from three-digit rates in the 1980s to the low single-digit range as its financial sector became more and more globally integrated. Curbing inflation has been a struggle for Israel for many years, since the very beginning of the state. After several failed efforts to stop the five-year-long hyperinflation, Israel's national-unity government implemented a successful stabilization program. The inflation rate nevertheless stuck persistently to the low two-digit levels until spillovers from the Great Moderation in advanced economies put entrenched inflation off. Israel climbed down from three-digit rates to two-digit rates, and the inflation rate later converged to the advanced countries' rate.

Globalization also affected the conduct of Israel's central bank. Inflation targeting, which was born in New Zealand in 1990, was adopted by Israel's central bank in 1993. Dovetailing the huge wage-depressing immigration flow and taking advantage of it, Israel's central bank gradually moved the inflation rate all the way down to the level seen in industrial countries. Admired for its transparency and accountability, it achieved success there, as well as in Canada, Australia, Britain and Sweden soon after. It subsequently also became popular in Latin America (Brazil, Chile, Mexico, Colombia and Peru) and in other developing countries (South Africa, South Korea, Indonesia, Thailand and Turkey, among others).

HEADING OFF EXTERNAL DEPRESSION PRESSURE

The 2008 global depression crisis came to the world as a surprising outcome. Pre-2008 macroeconomic models did not adequately capture the features of real-world business cycles: small recessions that occur in the interval between deep and long depression-recessions. All this was because traditional macroeconomic models ignored the role of financial intermediaries. These financial institutions were simply treated like a neutral conduit between savers and investors, and not as a source of crisis by themselves. This deficiency may have been remedied, but uncertainties remain. These are crucial to understanding the 2008 global financial crisis and its aftermath. Until they are resolved, Israel and the global economy may generally have difficulty coping with the Great Recession, the Eurozone crisis, and perhaps secular stagnation in some of the advanced economies, and especially in Europe.

ISRAEL'S IMMIGRATION STORY

Migration has become a huge political-economic issue. There are several problems with the argument that immigrants are an unmitigated economic boon. One is that almost any major economic event like a large-scale immigration has far-reaching distributional effects, very much like a big cut in trade barriers. Another is the fiscal burden arising from low-skill immigrants. By contrast, high-skill immigration brings with it fiscal gains, especially for an ageing society. In general, immigration enriches the workforce, allowing for a more finely-graded specialization, which raises average productivity and living standards. Diverse workforces are likely to be more productive, especially in industries in which success depends on specific knowledge, like computing, healthcare or finance. Indeed, Israel's migration episode was accompanied by a rise in labour productivity coupled with an increase in income inequality.

The exodus of Soviet Jews to Israel in the 1990s also had an impact on income inequality and the political balance of power. I recall the extraordinary experience of Israel, which received three-quarter of a million migrants from the former Soviet Union within a short time. This wave was distinctive for its large skilled cohort, which raised disposable income inequality without increasing market income inequality. In other words, the welfare state took a sharp regressive turn. The unique experience of Israel is markedly different from recent immigration experiences in the United States and Europe, where anti-globalization forces reign supreme.

COMPARING ISRAEL AND IRELAND

Ireland entered the 1950s as a very poor postcolonial society. However, it realized major successes thanks

to its integration into the EU and reached elite high-tech status. Ireland was able to attract from the rest of the world (excluding the EU) massive FDI, thanks to its status as a tax-sheltered gate to the huge EU markets. However, Ireland regulated its banking sector poorly and allowed the credit bubble to flourish in the wake of the 2008 global financial crash. Its overexposed banking sector subsequently collapsed during the financial crisis. Ireland has continued to be burdened by the Eurozone's nearly secular stagnation. Israel's robust performance during the crisis is partly attributable to its status as a non-member of a single currency area.

ISRAEL'S HIGH-TECH STORY

Dovetailing with immigration in the 1990s, the global information-and-communication-technology (ICT) surge led to the unprecedented growth of Israel's high-tech sector. Innovation requires scale, and scale requires trade. An isolated, small economy cannot be a centre of innovation. The incentives of entrepreneurs to invest effort and resources in generating valuable services are related to their ability to use the resulting knowledge repeatedly, on a large scale, over time. FDI provides critical incentives to be able to use scale economies, so as to leap from the precarious innovation stage at the confines of a small economy to the execution stage, by utilising the world markets. The globalization of an economy is crucial so that its nascent high-tech industry can develop and flourish. While the long-term benefits of the global ICT surge are palpable; in the short run, the simultaneous wave of financial liberalization contributed heavily to the surge in development and global economic growth from 1985 to 2008. However, deregulation turned out to be a two-way street. It spurred entrepreneurship, investment and technological progress, and the global technology surge spread into Israel's nascent high-tech industry. However, the surge also created a fertile environment for asset speculation and leveraging, with dire consequences when the dotcom crisis erupted.

BRAIN DRAIN

Brain drain is evidently the flipside of intensive globalization interactions and skill-biased immigration rules in advanced economies. Talent outflow is reinforced by the top level of Israel's academic institutions, and entrepreneurship increases the supply of skilled workers that is also partly channelled into the state-of-the-art, high-tech industry. Advanced science and technology institutions that are not located in the global centres suffer from a resource squeeze, as they bring to the world a growing supply of Israeli scientists who seek and find their opportunities elsewhere.

RISING INCOME INEQUALITY

Fast technological developments and globalization come in the case of Israel at the cost of rising income inequality. Israel's welfare redistributive policies have deteriorated. Sizeable communities exist with high fertility rates. Indeed, an international ranking of Israel's economy in terms of the population growth rates puts Israel at the very top among advanced economies. The high fertility rate among the Jewish ultra-Orthodox and the Israeli Arabs, and the lack of proper investment in children on the periphery to prepare them for the labour market, raises the dependency ratio, undermines the skill level of the labour force, and raises the fiscal burden of Israel as a welfare state. Even although the skill attainment of the labour force is currently high, demographic trends, if not reversed, could severely lower future GDP growth and weaken Israel's international competitiveness.

COST OF OCCUPATION

An important role played by globalization is in mitigating, not eliminating, the cyclical effects of the Palestinian uprising and points to its uncertain future consequences. However, the inconvenient circumstances of the Israeli-Palestinian conflict boil down to its uncertain long-term implications. The almost intractable conflict comes together with combustible internal conflicts. Concern is mainly over international political-economic isolation and explosive internal conflicts that tear the social and economic fabric. More precisely, the unresolved Palestinian-Israeli conflict poses a serious long-term threat to Israel's economic place in the world due to the danger of its isolation. There is also uncertainty about the possibility of cuts in trade and financial links for an economy that is currently integrated into the world financial and trade networks.

CONCLUSION

Some of the powerful forces of globalization – responsible for the inflection points in the history of the economy of Israel – include immigration waves; inflation-reduction spill-overs from the advanced economies during the Great Moderation; FDI in technology and spill-overs from the global information technology revolution; the effects of the large influx of skilled immigrants from the former Soviet Union; the rise in income inequality; the opening to East Asian large markets;² and the rising cost of occupation. These critical driving forces explain how Israel,

² The emerging market economies such as China, Vietnam, India and Indonesia abandoned autarky in favor of export-led growth in the mid-1980s. Suddenly, and with little warning, more than a third of the world's population joined the postwar globalization parade, powerfully effecting global demand everywhere, including Israel. Israel has significantly pivoted its trade to the emerging East Asian markets.

within a relatively short period, transformed from a developing to developed economy and gained entry in 2010 into the OECD – the thirty-five-member group of world advanced economies. Israel's fast development, although unique, is not unknown elsewhere. Ireland somewhat parallels Israel in greatly benefitting from globalization.

However, going forward, fundamental challenges are acute. FDI presently amounts to about 4 percent of GDP in Israel, compared to the OECD average of just 1.4 percent: for Israel, the OECD accounted for the lion's share of FDI inflows. Israel's exports of goods and services currently account for about 30 percent of the country's GDP, while imports of goods and services also amount to about 30 percent. For Israel, the OECD also accounts for the lion's share of its trade in goods and services. The uncertainty over the future Israeli economic and financial links to the global economy arises precisely from the potential of Israel being sanctioned by the international community and thereby becoming politically and economically isolated from some world markets due to future regional crises. Both sides of the Palestinian-Israeli conflict are following increasingly more extreme and polarizing trajectories.

These are major tests facing Israel's economy. The high fertility, low labour force participation, and excessive supply of school time to religious non-core studies in the ultra-Orthodox community can be explained in terms of the behaviour of a 'club' that has strengthened its norms of religious stringency, in an attempt to stay excluded from the outside world. In other words, its isolation from society forces this community to be redistributive and develop its own social insurance. Parents tend to endow their children with good skills to help maintain the survival of the club, but poor skills for the labour market outside of the club. Societal transformations that can reverse this trend are hard to come by. The high fertility rate and the low labour-market participation rate among the Jewish ultra-Orthodox, and to a lesser extent the Israeli Arabs, could boost dependency on the welfare state, which will have fewer revenue sources and more transfer to hand out. Furthermore, among the high-fertility groups, the lack of proper investment in education to prepare children for the labour market could create economy-wide productivity regress, which would negatively affect Israel's competitiveness in the global economy. Brain drain may reinforce the productivity-regress process. Overcoming such backward-driving forces that could weaken Israel's competitive power in the world economy is a major task for the future.

REFERENCE

Razin; A. (2018), *Israel and the World Economy: The Power of Globalization*, Cambridge MA: MIT Press.

Stefan Sauer and Klaus Wohlrabe

The New ifo Business Climate Index for Germany

The ifo Institute has regularly conducted economic surveys at a corporate level since 1949. The survey results are used to calculate the ifo Business Climate Index, among other things, which generates a great deal of media attention every month. It is one of the most important early indicators for economic developments in Germany. The ifo Business Climate Index consists of two components: assessments of the current business situation (BS) and survey participants' expectations for the next six months (BE). Both variables are collected on a monthly basis for manufacturing, construction, wholesaling, retailing and the service sector. Participants have the option of responding to both questions on a three-tier scale (good/satisfactory/poor and/or more favourable/unchanged/more unfavourable). To calculate the indicator, the responses are weighted according to the size and/or the annual turnover of the company in question. Balances are then calculated for both variables based on the shares of 'positive' and 'negative' responses. The business climate is then calculated from both balance figures using geometric averaging: $GK = [(BS + 200)(BE + 200)]^{1/2} - 200$. More detailed information on the construction of the ifo Business Climate Index are featured in Goldrian (2004). The business climate index has also been the subject of many scientific analyses. Abberger and Wohlrabe (2006), Seiler and Wohlrabe (2013), as well as Lehmann (2018) offer detailed overviews and show that the ifo index is the most important early indicator for economic developments in Germany. Despite its success, changes have been necessary from time to time. In recent decades the service sector has gained in importance for the German economy. Tertiarisation is constantly expanding. To date, however, results for the service sector have been published separately. Another feature of the index requiring adjustment is the aggregation, which will be subject to a small-scale update after over 40 years.

This is why the following changes will be made in the ifo business surveys as of April 2018:

1. The ifo Business Climate Index for industry and trade will be replaced by the ifo Business Climate

for Germany. This now also includes the service sector and will form the basis for the ifo Institute's monthly press release as of April 2018.

2. The ifo Business Climate Index for industry and trade (excluding the service sector) will still be calculated, but no longer commented on by the ifo Institute.
3. The base year for the index calculation will be changed from 2005 to 2015.
4. The aggregation procedure will be changed in detail, whereby the basic method of calculation (balance methodology) remains unchanged. Company responses (micro data) are now assigned differently to the hierarchy levels in some cases. This change means that all of the time series have been recalculated using the adjusted methodology.
5. In this recalculation of all of the time series, responses from companies were also taken into account which in the past were only submitted after the survey deadline and thus excluded from the aggregations.

In the following, the changes are described in detail as well as the extent to which these led to diverging developments in the newly-calculated time series.

THE NEW IFO BUSINESS CLIMATE FOR GERMANY

The most important change applies to the monthly key indicator the 'ifo Business Climate Index for Industry and Trade', which attracts a great deal of media attention and also directly influences share prices in the financial markets (see Mitnik *et al.* 2013a and 2013b). The term 'industry and trade' does not exist as an official definition in government statistics but was introduced by ifo to clarify that it does not cover all sectors relevant to the economy. To date it included manufacturing, construction, wholesaling and retailing, in which the ifo business surveys have been conducted since the end of the 1940s or since the beginning of the 1950s. The construction of a panel in the service sector did not begin until 2001, the first results having been published in 2005 (see Wohlrabe and Wojciechowski 2014). Now, the service time series are sufficiently long to allow integration into the overall index. Consequently, from April 2018, the 'ifo Business Climate for Germany' will be published, now including the service sector. This will acknowledge the increasing importance of the service industry for the German economy in recent decades. More than two-thirds of gross value added in Germany is now accounted for by the services sector. This tertiarisation is also reflected in the percentage weighting of the sectors that comprise the Business Climate for Germany: service sector (50.5 percent), manufacturing (30.2 percent), construction (6.0 percent), wholesaling (7.1 percent) and retailing (6.2 percent). The newly created index begins in January 2005; however, the previously



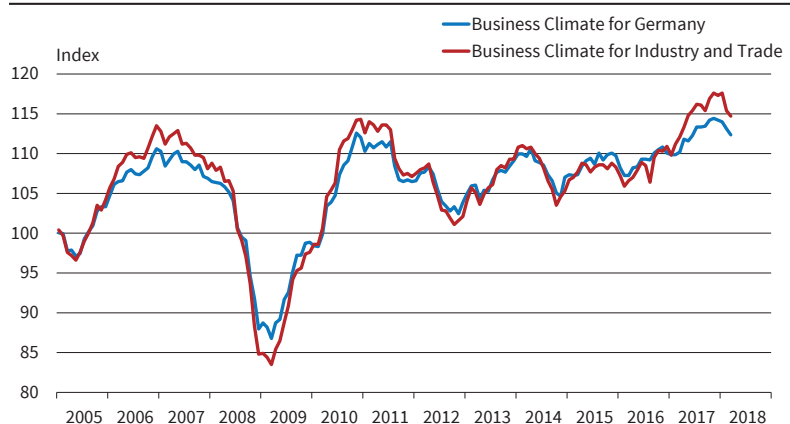
Stefan Sauer
ifo Institute



Klaus Wohlrabe
ifo Institute

Figure 1

Comparison 'ifo Business Climate for Industry and Trade' and 'ifo Business Climate for Germany' According to the New Aggregation



Source: ifo Business Surveys.

© ifo Institute

published indices for industry and trade will continue to be available from 1991, but will no longer be explicitly commented on in ifo's own press releases.

Figure 1 shows the old and the new ifo Business Climate Index with 2005 as the base year. A very similar course with the old index is seen in the figure although the new index is somewhat 'compressed' by the addition of service providers. For example, the cooling of the business climate during the economic and financial crisis in 2009 is not as dramatic, but the increase over the course of the past year until the beginning of 2018 is also weakened somewhat. As a rule, the fundamental trends are very similar. The correlation between both series is very high at 0.98. In individual months, however, the service industry may develop differently than the other sectors so that the Business Climate for Germany may take a different direction than that of German Industry and Trade. Since 2005, this has been the case in 18 percent of all months, or an average of about twice a year. Table 1 compares the volatility of the time series with the standard deviation of the time series and their first difference. Wohlrabe and Wollmershäuser (2017) show that often the monthly differences are better suited to derive forecasts of macroeconomic variables. For the new index, the fluctuations over time are lower both in terms of level and monthly differences.

The ifo Index is a leading index. This property is achieved by the expectation component as well as by the fact that the official statistics are published after some delay. The gross domestic product is commonly considered to be the most

prognostic properties of the ifo indicators has been recently demonstrated by Heinisch and Scheufele (2018) using statistical and econometric methods.

THE EFFECT OF THE NEW BASE YEAR

In connection with the conversion, the base year for the index calculation will also be adjusted from 2005 to 2015.¹ The indexation to a base year, however, is only a pure scale effect (conversion of balance points into index points) and has no effect on the economic interpretation.² Figure 2 shows the 'ifo Business Climate for Germany' with base year 2005 and with base year 2015. As the balance of the 'Business Climate for Germany' in 2015 was significantly higher than in 2005, a rebasing on this year leads to a downward shift, which amounts to around 9 index points. While

¹ In its most recent publications, the Federal Statistical Office has also changed over to the base year 2015 (see Federal Statistical Office 2018).

² In interpreting the base year, note that values above 100 mean that the value is higher than the average of the base year 2015.

Table 1

Volatility Comparison (Standard Deviation) of the Old and New Business Climate

	Climate	Level	
		Situation	Expectations
Industry and Trade	7.05	9.59	6.03
Germany	5.80	7.92	4.91
First monthly difference			
	Climate	Situation	Expectations
Industry and Trade	1.42	1.70	1.64
Germany	1.20	1.50	1.44

Source: ifo business surveys; calculations by the ifo Institute.

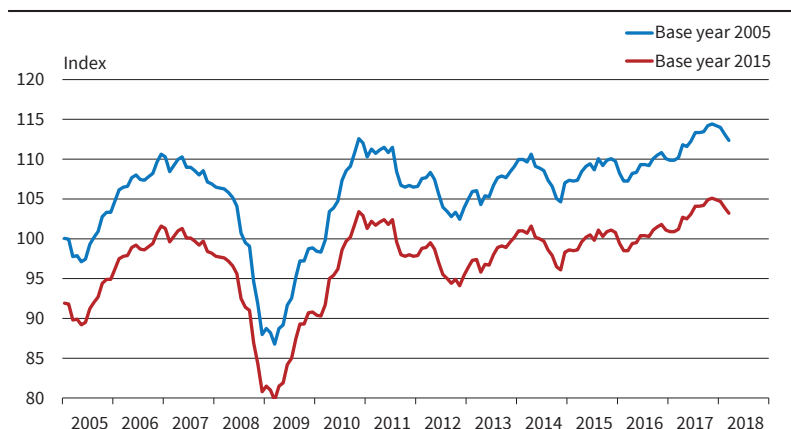
Table 2

Correlation Comparison between Gross Domestic Product and the ifo Business Climate

	GDP	Quarterly growth rate	Annual growth rate
Industry and Trade		0.585	0.805
Germany		0.543	0.854

Source: Calculations by the ifo Institute.

Figure 2
Effect of the Base Year for the ifo Business Climate for Germany



Source: ifo Business Surveys. © ifo Institute

the index value of March 2018 with the new base year is 103.2, it would be 112.4 using 2005 as the base year.

CHANGES IN THE AGGREGATION METHODS

The previous aggregation in the context of the balance methodology was carried out in a tree-like structure based on the official economic branch classification WZ2008 of the German Federal Statistical Office (see Federal Statistical Office 2008). An exemplary section of this tree structure is shown in Figure 3 for the manufacturing sector up to the third level. The highest level, here the entire manufacturing industry, is the so-called one-digit level. On the two-digit level, well-known industries are listed, such as the automotive industry or mechanical engineering.³ Below this level, the structure has different aggregation depths, some of which extend to the six-digit level. The aggregation of the responses within this tree structure is done from bottom to top. Each company response is assigned to a branch of industry at the lowest level of the hierarchy⁴ and is given an individual weight. In the manufacturing sector,

this is determined by the number of employees. The responses of larger companies are thus more important than those of smaller companies. For each industry branch with sufficient

³ In the official terminology of the Federal Statistical Office, one-digit items are referred to as sections and two-digit items as divisions. The levels below are called groups, classes, and subclasses.

⁴ The responses are made at the product level. As a result, a company usually reports on its main product or, in some cases, even answers several questionnaires for its various products. Thus, the answers can be more accurately assigned to the economic sectors.

answers,⁵ a balance is formed from the shares of positive and negative responses. Subsequently, the balances are aggregated to the next higher level according to their gross value added share.⁶ In the example in Figure 3, the results of the machine tool industry as well as for gearbox and gear manufacturers (plus the other subsectors of mechanical engineering) are included in the balance for the mechanical engineering sector. Finally, all balances at a two-digit level are also aggregated with a weighting relative to the gross value

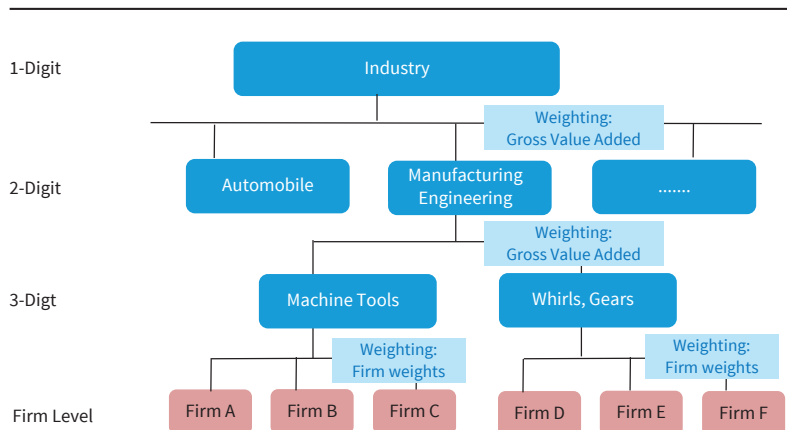
added shares to the total manufacturing sector.

Even though the aggregation displayed in the tree structure in Figure 3 may be intuitive, it has some practical disadvantages. The company panel in the ifo business surveys is not constant over time. Companies drop out and new ones are added. This also has an impact on the representation of individual economic sectors. First, in some areas there may be too few companies over time. The corresponding balances would then probably no longer be an accurate depiction of economic development. Balances based on fewer responses are more volatile than those with many responses. On the other hand, it is possible that the balance values have somewhat high (extreme) balance values such as +100.

⁵ There is no definition of what is 'sufficient'. This depends on the sector of economic activity. In some cases, five companies have more than 80 percent market coverage, which would be sufficient to aggregate. In other areas, more companies have to be correspondingly gained.

⁶ Vehicle construction in Germany, for example, has a significantly higher share of added value than, for example, the textile industry.

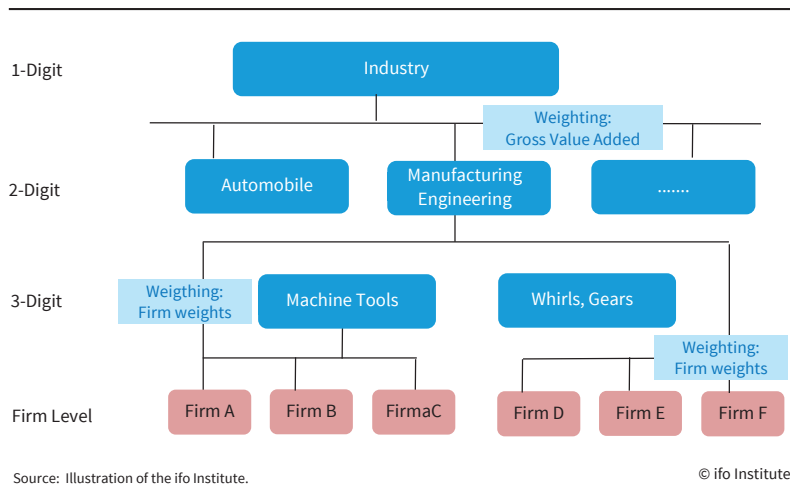
Figure 3
Illustration Aggregation Scheme Valid up to March 2018



Source: Illustration of the ifo Institute.

© ifo Institute

Figure 4
Illustration Aggregation Scheme from April 2018



Source: Illustration of the ifo Institute.

© ifo Institute

Table 3
Correlations Between the New and the Old Aggregation

	Business climate	Business situation	Business expectations
Manufacturing	0.995	0.994	0.995
Construction	0.998	0.998	0.987
Wholesaling	0.957	0.955	0.931
Retailing	0.971	0.979	0.919
Services	0.979	0.982	0.971

Source: ifo business surveys; calculations of the ifo Institute.

There is thus the possibility that this will distort the upper aggregates as well. Another important aspect is that some responses cannot even be considered because there are not enough companies to form their own (sub) aggregate. Because of these problems, the aggregation requirements must be constantly examined and adjusted.

To alleviate these problems, a change is made in the allocation of the microdata for the calculation of balances, as illustrated in Figure 4. The most important difference is that balances from the

three-digit level are no longer used to calculate balances at the two-digit level. This means that all microdata allocated to mechanical engineering are directly included with their company weight in the balance calculation of mechanical engineering. This idea is also followed at the lower levels. All microdata, for example from the field of machine tools, are used in this way independently of further underlying four- or five-digit aggregates. This approach has the advantage that the maintenance of the aggregation scheme is easier and possible distortions from poorly filled sub-aggregates are minimised. In addition, all responses can be used at any time as they can be consistently assigned to a two-digit aggregate.

In the other economic sectors, the calculations are made as in the manufacturing sector. The aggregation method in the service industry, for example, was adapted in such a way that the responses flow directly with the company weight into the two-digit level. In distribution, the responses are now also grouped directly at the second-digit level. Only in determining the company weights are there differences between the individual sectors. Whereas in the construction industry the number of employees is used for this, in distribution and in the service sector the allocation of company weights is based on the respective annual sales.

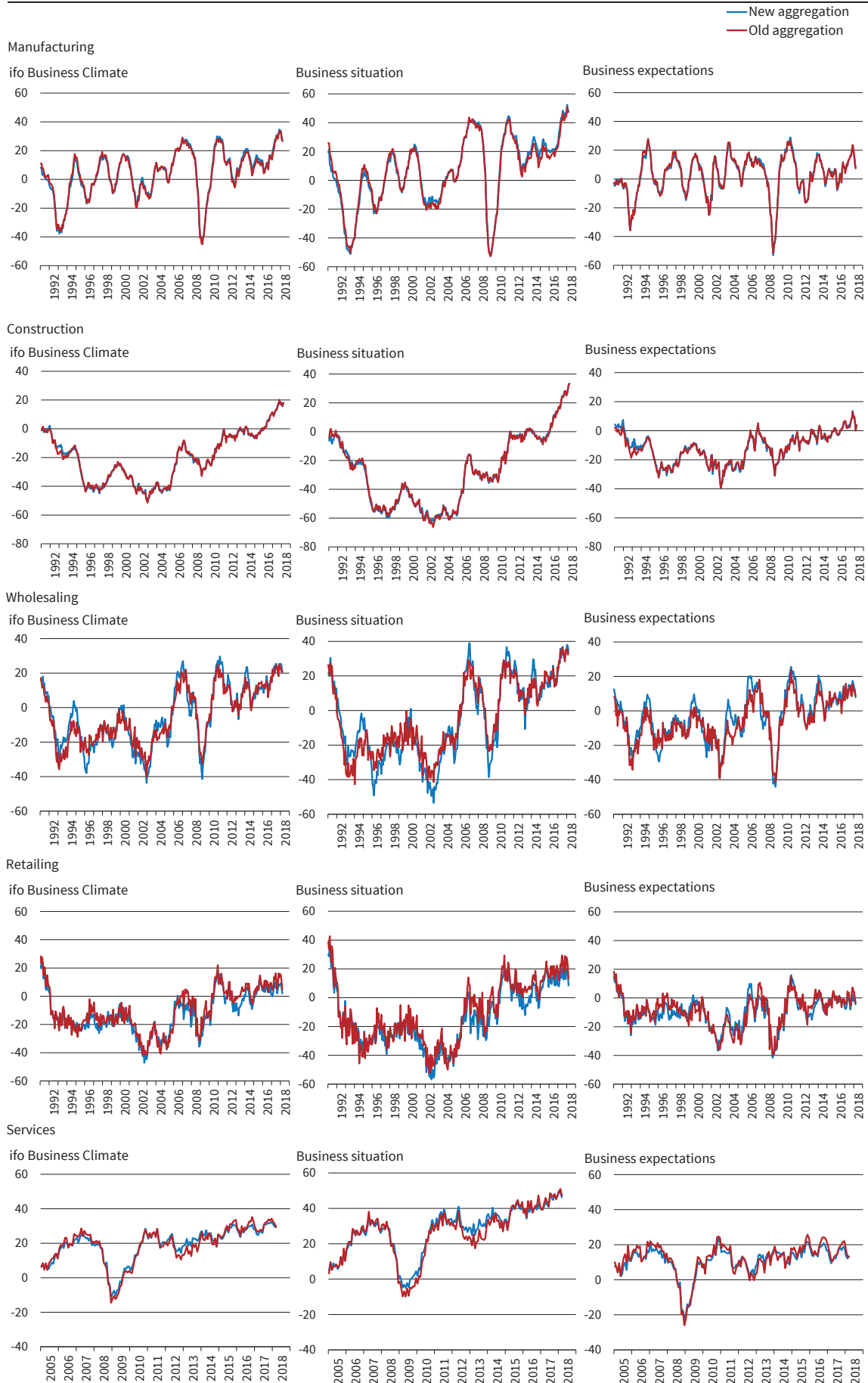
Table 4
Comparison of the Volatility (Standard Deviation) of the New and Old Aggregation

	Level					
	Business climate		Business situation		Business expectations	
	old	new	old	new	old	new
Manufacturing	15.95	16.31	23.18	23.88	13.69	13.63
Construction	17.07	17.23	24.32	24.30	10.16	10.48
Wholesaling	15.98	17.62	20.83	23.12	12.53	13.66
Retailing	15.15	13.99	21.59	19.90	11.06	10.20
Services	10.67	9.64	14.47	13.25	9.28	8.02
First monthly differences						
	Business climate		Business situation		Business expectations	
	old	new	old	new	old	new
Manufacturing	3.07	2.97	3.60	3.51	3.84	3.66
Construction	1.97	1.87	2.53	2.31	2.71	2.69
Wholesaling	4.30	3.97	5.68	5.21	5.03	4.16
Retailing	5.38	4.46	7.83	6.57	5.32	4.05
Services	3.08	2.67	4.27	3.58	4.19	3.39

Source: ifo business surveys; calculations of the ifo Institute.

Abb. 5

Comparison of the Old and New Aggregation Scheme
Balances, seasonally adjusted



Source: ifo Business Surveys.

© ifo Institute

RECALCULATION OF ALL TIME SERIES FROM 1991

The above-described changes in the aggregation procedures necessitate that all time series created within the framework of the ifo business surveys must be recalculated retroactively from 1991 onwards. This applies not only to the most observed indicators such as the business climate, business situation and business expectations, but also to questions such as those about prices, production, exports, employment or inventories. As part of this recalculation, the microdata base was also adjusted. It happens every month that company responses arrive after the calculation of the different indicators and that they are thus not included in the survey results. These late responses, which typically account for less than one percent of total replies, are in the database and are now taken *ex-post* into consideration for the recalculation.

COMPARISON OF THE TIME SERIES AFTER THE NEW AND OLD AGGREGATION PROCEDURES

Figure 5 shows the time series for each of the three main indicators (climate, situation and expectations) of the economic sectors according to old and new aggregation.

The results show that the recalculation changed very little in the basic runs of the time series, especially in the manufacturing sector and in the construction industry. In distribution, especially in wholesaling, the above-described change of the weighting method beginning at the two-digit level displayed somewhat larger changes. The time series are now much smoother, which enables clearer economic statements. Table 3 shows the correlations between the time series after the new and the old aggregation. The values are consistently very high and all greater than 0.91. For manufacturing and construction, the correlation is *de facto* 1.00. For the two distribution sectors, the correlations are somewhat lower, which is attributable to the lower volatility due to the new aggregation. All in all, this shows that the historically fundamental economic features have not changed. The reduction in the volatility of the time series already mentioned in relation to distribution, is confirmed by the standard deviation of the time series and their first difference, which are shown in Table 4. Also in the case of the service providers, volatility also falls significantly, especially in the case of monthly differences.

CONCLUSIONS

This article describes the biggest changes to the ifo Business Climate Index in years. From April 2018 on, the proven 'ifo Business Climate Index for Industry and Trade in Germany' will be replaced by the 'ifo Business Climate for Germany'. The new index now includes service providers and thus represents an

even larger part of the German economy. The new business climate index is calculated with 2015 as the base year and available from 2005. The aggregation rules have also been partly redefined, whereby the basic method of calculation (balance methodology) remains unchanged. This simplifies the maintenance of the (sometimes deeply disaggregated) aggregation hierarchies and on the other hand reduces possible distortions in the calculations. This adjustment requires a recalculation of all time series that are formed within the ifo business surveys. The end effect is that the general economic forecasts and interpretations remain largely unchanged overall. The adjustment of the aggregation process has led to less volatility in many series, especially in distribution and the services, both of which now give clearer economic signals. In the near future, the ifo Institute will also publish a new handbook of ifo surveys and economic indicators (Sauer and Wohlrabe 2018), which will contain detailed information on all surveys of the ifo Institute and the indicators calculated from these surveys as well as their use in economic forecasts.

REFERENCES

- Abberger, K. and K. Wohlrabe (2006), "Einige Prognoseeigenschaften des ifo Geschäftsklimas – Ein Überblick über die neuere wissenschaftliche Literatur", *ifo Schnelldienst* 59(22), 19–26.
- Goldrian, G. (2004), *Handbuch der umfragebasierten Konjunkturforschung*, ifo Beiträge zur Wirtschaftsforschung 15, Munich: ifo Institute.
- Heinisch, K. and R. Scheufele (2018), "Should Forecasters Use Real-time Data to Evaluate Leading Indicator Models for GDP Prediction? German Evidence", *German Economic Review*, forthcoming.
- Lehmann, R. (2018), *The Forecasting Properties of the ifo Business Survey*, mimeo.
- Mittnik, S., N. Robinzonov and K. Wohlrabe (2013a), "Was bewegt den DAX?," *ifo Schnelldienst* 66(23), 32–36.
- Mittnik, S., N. Robinzonov and K. Wohlrabe (2013b), *The Micro Dynamics of Macro Announcements*, *CESifo Working Paper* 4421.
- Sauer, S. and K. Wohlrabe (2018), *Handbuch der ifo Umfragen und Konjunkturindikatoren*, ifo Beiträge zur Wirtschaftsforschung, forthcoming.
- Seiler, C. and K. Wohlrabe (2013), "Das ifo Geschäftsklima und die deutsche Konjunktur", *ifo Schnelldienst* 66(18), 17–21.
- Statistisches Bundesamt (2008), *Klassifikation der Wirtschaftszweige*, Wiesbaden.
- Statistisches Bundesamt (2018), *Konjunkturindizes werden auf Basisjahr 2015 umgestellt*, Press Release 073 (6 March), Wiesbaden.
- Wohlrabe, K. and P. Wojciechowski (2014), "Die ifo Konjunkturbefragungen im Dienstleistungssektor – Hintergründe, Erklärungen und Performance", *ifo Schnelldienst* 67(21), 47–53.
- Wohlrabe, K. and T. Wollmershäuser (2017), "Über die richtige Interpretation des ifo Geschäftsklimas als konjunktureller Frühindikator", *ifo Schnelldienst* 70(15), 42–46.

Adelina Jashari*, Jana Lippelt** and Marie-Theres von Schickfus***

Unexpected Rapid Fall of Wind and Solar Energy Prices: Background, Effects and Perspectives

Renewable energies (RE) are playing an increasingly important role in the energy system: their share of global primary energy consumption was 9 percent in 2016, having risen 4 percent per year since 2000 and thus twice as fast as primary energy demand (IEA 2017). As early as 2015, 156 gigawatts (GW) of capacity had been installed worldwide in all renewable energy sectors. At around 44 percent, China had by far the largest share in the expansion of renewable energies (see Figure 1, upper diagram). The United States and Japan accounted for a further 10 percent and 7 percent, respectively, followed by Germany and India (each just under 5 percent). The worldwide installed wind and solar capacity alone increased by 126 GW in 2016, which was in line with newly installed capacities for fossil fuels.

The speed and scale of this growth by far exceeded expectations from scenarios and forecasts. In addition, in 2016 and 2017, falling prices for renewables made headlines. For the first time, auctions were carried out in many countries to set subsidy amounts. The successful bids were well below the previous feed-in tariffs and continued to decline from auction to auction – in some cases up to 0 cent/MWh. In the following, the background of these developments is examined in more detail and their significance for future developments of renewable energies expansion is outlined.

PREVIOUS MISJUDGEMENTS OF RENEWABLES EXPANSION

Previous assessments stand in strong contrast to the observed development, especially for photovoltaics (PV). Conventional models, such as those used for future scenarios of the International Energy Agency (in the World Energy Outlook), the WBGU or Greenpeace, assumed that PV would account for 5–17 percent of

electricity supply by 2050. In fact, PV has had the highest growth rate and steepest learning curve of all renewable energy technologies. A recent article in *Nature Energy* (see Creutzig *et al.* 2017) illustrates the previous underestimations: all scenarios examined were below the actual development of installed capacity. While updated estimations assumed realised capacity as a new starting point, they still underestimated growth. The reasons stated in the article are above all promotion policies, steep technological learning effects, and cost increases of technologies competing with PV:

- Due to political preferences, technology-specific subsidies (e.g. feed-in tariffs for PV) were introduced in many countries. As a result, PV established itself as a low-risk and long-term investment and the PV market grew strongly. In Germany, for example, this led to private capital inflows from home-owners and small interest groups. However, such technology-specific promotion models and preferences of small market participants are not shown in the forecasting models.
- The percentage price decrease for modules per doubling of installed capacity – the learning rate – is on average 22.5 percent for PV, which is significantly higher than the average learning rate for other technologies. This increases the potential for underestimating expansion, since larger installed capacities can quickly lead to lower costs and thus further accelerate expansion.
- In the models, the assumptions about cost, potential and acceptance of alternative CO₂ mitigation technologies were overly optimistic. An example of this is the assumptions on carbon capture and storage technologies. From the perspective of the entire energy system, these assumptions implied a too pessimistic outlook for PV.

RESULTS OF RE AUCTIONS: SURPRISES IN COSTS

In recent years, more and more RE subsidies have been awarded based on auctions, i.e. the remunerations for operators of new RE systems are no longer based on fixed feed-in tariffs. Instead, countries set a certain amount of capacity to be built, and the remuneration paid per megawatt hour (MWh) of electricity generated depends on the bids in the auction. The auctions revealed that the actual cost reduction potentials for both solar and wind energy were significantly higher than often expected.

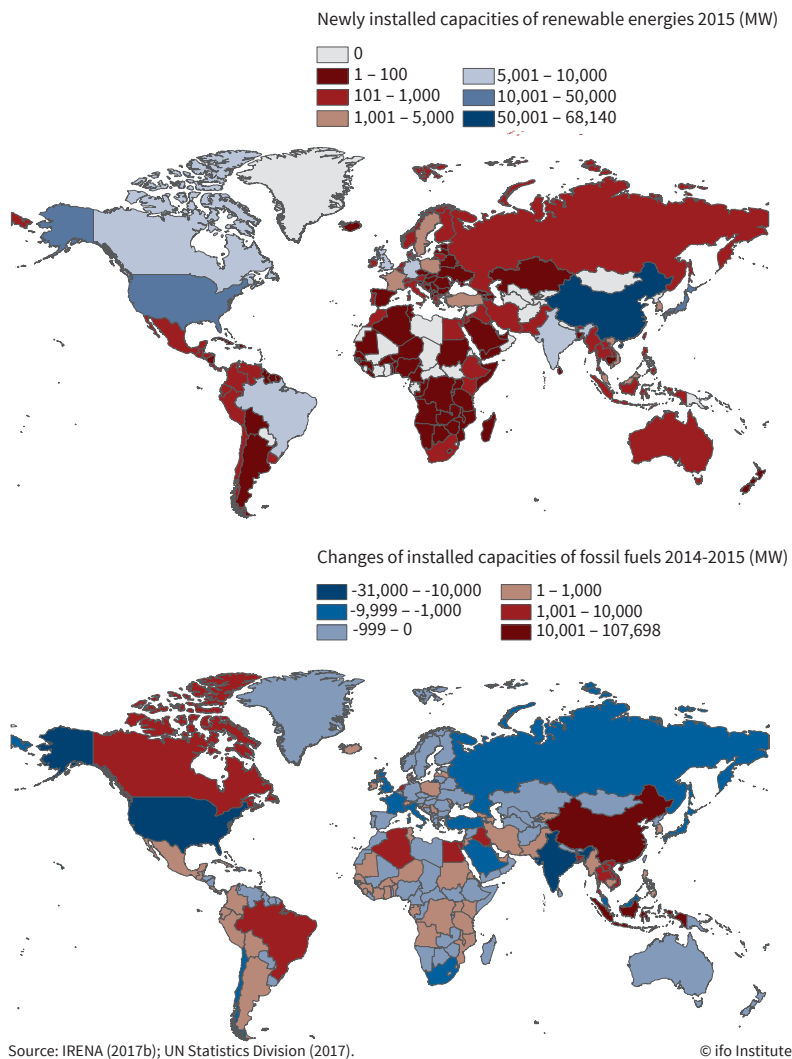
It is important to emphasise here that the auction bids must cover all costs of installation and operation of the equipment: while the learning rates mentioned above are usually based on module prices – i.e. the pure material costs for the technology – the auction prices also include the costs for on-site installation and maintenance, as well as frequently for land use and grid connection. This second cost block benefits less

* ifo Insitute

** ifo Insitute

*** ifo Insitute

Figure 1
Development of Renewable Energies and Fossil Fuels



from technology development and thus accounts for an increasing share of total costs due to falling module prices. It is even more remarkable that the total cost of renewables also shows such a decline.

In Germany, subsidies for PV and wind energy+ projects with a capacity exceeding 750 kW were converted to an auction-based system in the context of the Renewable Energy Law (*Erneuerbare-Energien-Gesetz EEG*) 2017. The lowest bidders are awarded the contract for their wind power or PV system until the advertised capacity is exhausted. Since the subsidies of renewable energy are transferred from the state to the consumers *via* a fee on the electricity price, consumers benefit from lower subsidies *via* the electricity price.

Already at the first wind power auction in May 2017, the subsidies could be reduced from formerly up to €90/MWh to less than €50/MWh. At the second auction in October, the bids were even lower and averaged €42.8/MWh (BMWi 2017). Pilot auctions for photovoltaics have been carried out since 2015. It can clearly be seen in Figure 2 how the price fell

from auction to auction and is currently lower than €50/MWh.

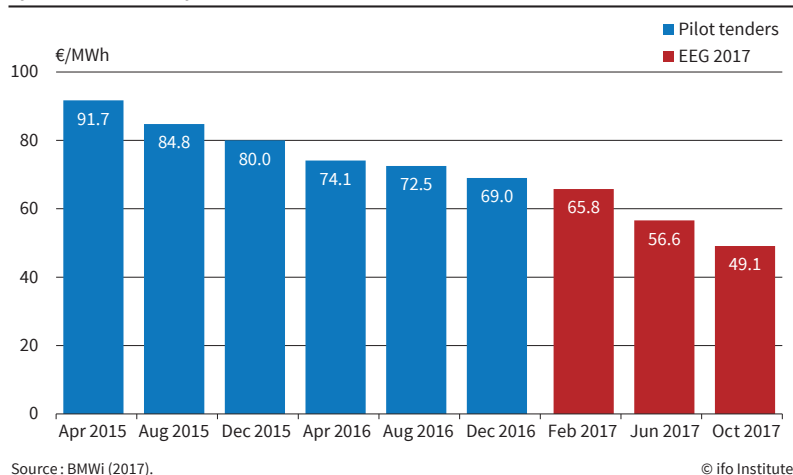
REASONS FOR THE PRICE DECLINE

Some globally relevant factors have contributed to the collapse of the auction prices: initially, the components for solar and wind plants became increasingly cheaper. From the last quarter of 2015, average solar module prices fell by around 29 percent within one year. But even in the wind sector, the costs per MWh have fallen sharply due to ever larger turbines and efficiency gains (REN21 2017). These cost reductions can be attributed, among other things, to the above-mentioned high expansion rates, especially in developing countries, and the associated learning effects. Added to this is the historically low level of interest rates, inducing institutional investors to increasingly look for new investment opportunities – while they are also attracted by the guaranteed subsidy payments. Another factor is the increasing competition between the project develop-

ers and the fact that among them are now some state-supported companies that have other advantages in project financing (such as the Italian energy group Enel or the state-owned company Masdar from Abu Dhabi, lowest bidder at the 2017 auction in Saudi Arabia).

In addition, the invitations to tender and the announcement of the price bids generated a great deal of publicity. Market observers and participants were able to use the results to reach a more accurate estimate of prices realisable in the future – one possible reason why auction prices continued to fall from auction to auction: solar PV auctions in Mexico for €40.76/MWh in March 2016 were followed by bids for 34.17 €/MWh in August 2016 in Chile and 39.65 €/MWh in March 2017 in Dubai. Finally, the auction in Saudi Arabia, where a bid for 16.82 €/MWh won the auction, caused a sensation. However, the results in individual countries are only comparable to a limited extent. As is well known, the countries differ in their natural conditions, so of course Chile or Dubai have a very different solar radiation than e.g. Germany. Apart from that, the results are also

Figure 2
Development of Auction Prices for Tenders for Photovoltaic Ground-mounted Systems in Germany



heavily dependent on the design of the auctions and the legal framework.

SPECIAL CASE OFFSHORE WIND?

The offshore wind industry occupies a special position among renewable energies. For years, offshore wind was considered a more difficult and expensive technology than onshore wind; in the German EEG, the average subsidy for installations commissioned in 2016 was around €100/MWh. But in the case of offshore wind, the introduction of auctions has led to a radical change in thinking. After results of €72.2/MWh and €49.9/MWh had already been achieved in auctions in the Netherlands and Denmark in 2016, observers predicted values of between €60/MWh and €90/MWh for the first German offshore auction in March 2017. In fact, however, two candidates (the German EnBW and the Danish DONG Energy) submitted zero-bids: they were prepared to forego state subsidies altogether and, in fact, applied only for installation and operating licenses. Their revenues will come solely from the marketing of electricity on the stock market.

The zero bids mark a *caesura*. Not only has offshore wind overtaken the two 'classic' renewable technologies, onshore wind and solar, and shown that renewables can get by without subsidies; in addition, the auction results signalled that a subsidy-free expansion of offshore wind could also be possible at other locations. The Netherlands responded to the German auction results by changing their next call for tenders in December 2017: they simply set a maximum bid of 'zero euro' for the development of the section 'Hollandse Kust Zuid' and received applications from Statoil, Innogy and Vattenfall. In March 2018, Vattenfall was announced as the winner (Reuters 2018).

In the offshore sector, too, several internationally relevant factors have contributed to price erosion. Offshore technology is becoming cheaper and more efficient. As the German '0-euro projects' of

the 2017 auction need to be completed in the years 2024 and 2025 respectively, the project developers can also include future technology improvements in their calculations. In addition, as everywhere, the low interest rate is noticeable. Nevertheless, the situation for offshore projects differs structurally from the onshore and solar sectors. Offshore wind power plants are more similar in size and investment volume to traditional large power plants; the development alone can cost between 10 and 30 million euros. As a result,

large corporations are particularly active in this field. They are capable of projects of this size, and they had problems with the small-scale nature of decentralised renewables anyway. Since the technical risk has diminished over the last five years, the size of the projects and their operators also make the offshore facilities attractive for institutional investors such as insurance companies or pension funds, which tend to stay out of smaller projects due to the high transaction costs. While the decentralised expansion of wind and solar energy has led to a greater role for small investors in the energy sector, especially in Germany, the traditional large investors are dominant in the offshore sector.

REALISATION RATES

When evaluating the recent auction results for PV, onshore and offshore wind, the biggest question currently concerns the realisation of the projects that were offered. When the record bids were published, many observers expressed doubts as to whether the project developers could meet their implementation obligations at these prices. Since most of the auctions are not so long ago, data on realisation rates are only available for Germany, France, Brazil and South Africa.

In Germany, 90 percent of the third round of tenders for PV systems has already been connected to the grid. 40 applications for eligibility were received in time. For this entitlement, the facilities must be in operation and be online on time, otherwise they lose their entitlement to the subsidy and they will receive a fine (Bundesnetzagentur 2018). For tenders for onshore wind farms, special regulations exist in Germany. These relate to the so-called 'citizens' energy companies' (*Bürgerenergiegesellschaften*), which may apply without a construction and operating license and only need to obtain a license in case their bid is successful. As a result, the implementation deadline for these citizens' energy companies is extended to 4.5 years,

and the planned grid connection will be postponed by ca. 2 years. The reason for this special arrangement is the intention of the legislator to allow citizens from the affected areas to participate in the market. The exemption for citizens' energy companies applied to around 92 percent of the successful bids in the first round of onshore wind tenders (Enervis 2017).

In Brazil, the timely implementation rate in 2016 was 14 percent and the late realisation was 89 percent. The reasons for delay relate e.g. to network expansion and compliance with environmental compatibility requirements. Adjusting the auction design could control these factors, but project management and bankruptcy also affect timely implementation. In France, 44 percent of the projects were realised. It was not possible to investigate which factors influenced the timely completion because the companies that were successful in the auctions were not named (Bayer *et al.* 2016). South Africa, on the other hand, realised all projects on time.

To increase implementation quotas, countries resort to various measures in addition to penalties. In Brazil, participants in the auctions are required to provide extensive supporting documents, such as a positive environmental impact assessment, grid access approval or wind reports from independent authorities. In France, PV systems in buildings only require a completed CO₂ assessment form. In Brazil, Italy and Denmark additional guarantees must be submitted as security (Agora Energiewende 2014).

OUTLOOK

The ever-decreasing prices for renewable energy projects and the rapid expansion in recent years will lead to a re-evaluation of the potential of wind and solar energy in the medium term, even if the actual realisation rates remain to be seen. Obviously, there are a variety of different factors that have led to ever new record results. Some are country-specific and especially due to particular aspects of the auction design: in some cases, the design of auctions reflects more policy goals than just the achievement of additional renewable energy generation at the lowest possible cost, as the German example of preferred citizens' energy companies shows. Other factors are important worldwide, such as current low interest rates and institutional investors search for safe returns, as well as underestimated learning rates in wind and solar technology. A weakening of these factors is not in sight for the next few years, but could change the outlook over the long term.

For a final evaluation, some questions remain. For example, the record results for solar energy in the Middle East, as well as those for offshore wind energy in Europe, seem to be driven by bidding competition in which losses or very low profits are accepted to secure market share. It is difficult to say if such strategies will be pursued in the future. Moreover, the worldwide

success of renewable energies does not change the fact that the expansion of fossil fuels continues in some countries. In addition to regenerative energies, about 108 GW of conventional power plants (excluding nuclear energy) were built in China in 2015 (see Figure 1, lower diagram). Something similar was observed – albeit to a lesser extent – for Canada and Brazil (just under 5 GW or almost 2 GW of new fossil capacity). Significant expansion rates were also recorded in other emerging and developing countries in 2015. In contrast, there is a significant decline in these power plant capacities in countries such as India, the United States and Russia. After deducting the dismantling of fossil power plants in the period 2014/2015, the installed net capacity worldwide amounted to 81 GW, well over half the increase in renewables.

Nevertheless, fossil power plants often have lifetimes of up to 50 years, so they are expected to emit CO₂ for a very long time. In addition, Creutzig *et al.* (2017) show that the current tendency in models to underestimate wind and solar energy goes hand in hand with the overestimation of the potential of biomass. The increased and faster than expected expansion of wind and solar capacity cannot translate directly into reduced emissions; this requires further efforts in the electricity sector as well as in other sectors such as transport and heat. It is also evident that the increasing proportions of intermittent renewables necessitate an adjustment of the energy system. In particular, storage technologies will be crucial to their system integration.

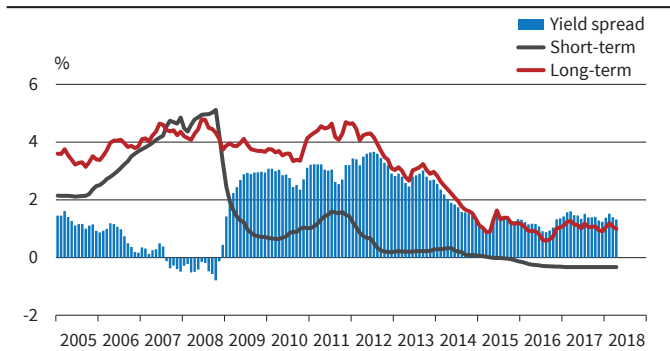
REFERENCES

- Agora Energiewende (2014), *Ausschreibungen für Erneuerbare Energien. Welche Fragen sind zu prüfen?*, https://www.agora-energie-wende.de/fileadmin/downloads/publikationen/Hintergrund/Ausschreibungsmodelle/Agora_Ausschreibungen_fuer_Erneuerbare_Energien_web.pdf.
- Bayer, B., D. Schäuble and M. Ferrari (2016), *Internationale Erfahrungen mit Ausschreibungen für erneuerbare Energien*, IASS Working Paper.
- Bundesministerium für Wirtschaft und Energie (2017), *Dossier – Erneuerbare Energien*, <https://www.bmwi.de/Redaktion/DE/Dossier/erneuerbare-energien.html>.
- Bundesnetzagentur (2018), *Realisierungsrate der dritten Ausschreibungsrunde für Photovoltaik-Freiflächenanlagen*, https://www.bundesnetzagentur.de/SharedDocs/Pressemitteilungen/DE/2018/20180109_PVFreiflaechenanlagen.html.
- Clover, I. (2016), “Danish Solar Auction Delivers European Low Cost of US 1.81 Cents/kWh”, *PV-magazine*, <https://www.pv-magazine.com/2016/12/28/danish-solar-auction-delivers-european-low-cost-of-us-1-81-centskwh/>.
- Creutzig, F., P. Agoston, J.C. Goldschmidt, G. Luderer, G. Nemet and R.C. Pietzcker (2017), “The Underestimated Potential of Solar Energy to Mitigate Climate Change”, *Nature Energy* 2, <https://www.nature.com/articles/nenergy2017140.epdf>.
- Danish Energy Agency (2016), *Pilot Tender of Price Premium for Electricity from Solar PV*, <https://ens.dk/en/our-services/current-tenders/pilot-tender-price-premium-electricity-solar-pv>.
- Dipaola, A. (2017), “Saudi Arabia Gets Cheapest Bids for Solar Power in Auction”, *Bloomberg Markets*, <https://www.bloomberg.com/news/articles/2017-10-03/saudi-arabia-gets-cheapest-ever-bids-for-solar-power-in-auction>.
- Enervis (2017), *Wind-Auktion: Unsicherheit beim Zubau – Politik reagiert kurzfristig*, https://enervis.de/wp-content/uploads/2017/12/enerviews_2017_07_Auktion_1_Wind.pdf.

- Erneuerbare Energien (2018), *Realisierungsquote bleibt hoch*, <https://www.erneuerbareenergien.de/realisierungsquote-bleibt-hoch/150/406/106089/>.
- ET Bureau (2017), "HC Puts Gujarat Wind Power Auction on Hold", *Economic Times*, <https://economictimes.indiatimes.com/industry/energy/power/hc-puts-gujarat-wind-power-auction-on-hold/articleshow/61211612.cms>.
- Global Climatescope (2016), *Download Climatescope Model*, <http://global-climatescope.org/en/download/data/climatescope-full-2016.csv>.
- Huebler, D., D. Radov and L. Wieshammer (2017), *Hart am Wind: Einsichten aus der Optionsbewertung zu den Ergebnissen der ersten deutschen Offshore-Wind-Ausschreibung und ihren Auswirkungen*, NERA Economic Consulting, http://www.nera.com/content/dam/nera/publications/2017/PUB_Offshore_EMI_German_A4_0417.pdf.
- IEA (2016), *World Energy Outlook 2016*, OECD/IEA, <http://www.oecd-ilibrary.org/docserver/download/6116221e.pdf?expires=1518085830&id=id&accname=ocid56012597&checksum=A69AEFF8A95CF71671566A58F3FA9905>.
- IEA (2017), *World Energy Outlook 2017*, OECD/IEA, <http://www.oecd-ilibrary.org/docserver/download/6117271e.pdf?expires=1518085868&id=id&accname=ocid56012597&checksum=66019896DA09997C6E7BB4A059F0D5B2>.
- IRENA (2017a), *Renewable Energy Statistics 2017*, http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Jul/IRENA_Renewable_Energy_Statistics_2017.pdf.
- IRENA (2017b), *Rethinking Energy 2017: Accelerating the Global Energy Transformation*, http://www.irena.org/documentdownloads/publications/irena_rethinking_energy_2017.pdf.
- Morning Consult (2016), *Coal Plants Are Shutting Down, with or without Clean Power Plan*, <https://morningconsult.com/2016/05/03/coal-plants-shutting-without-clean-power-plan/>.
- Newbery, D. (2016), *Pricing Electricity and Supporting Renewables in Heavily Energy Subsidized Economies*, EPRG Working Paper 1618.
- PV Insights (2018), *Index*, <http://pvinsights.com/index.php>.
- REN21 (2017), *Renewables 2017 Global Status Report*, http://www.ren21.net/wp-content/uploads/2017/06/17-8399_GSR_2017_Full_Report_0621_Opt.pdf.
- Reuters (2018), *Sweden's Vattenfall Wins Dutch 700MW Offshore Wind Tender*, <https://uk.reuters.com/article/uk-netherlands-windpower/swedens-vattenfall-wins-dutch-700-mw-offshore-wind-tender-idUKKBN1GV2BP>.
- UN Statistics Division (2017), *Electricity Profiles*, <https://unstats.un.org/unsd/energy/Eprofiles/default.htm>.

Financial Conditions in the Euro Area

Nominal Interest Rates^a

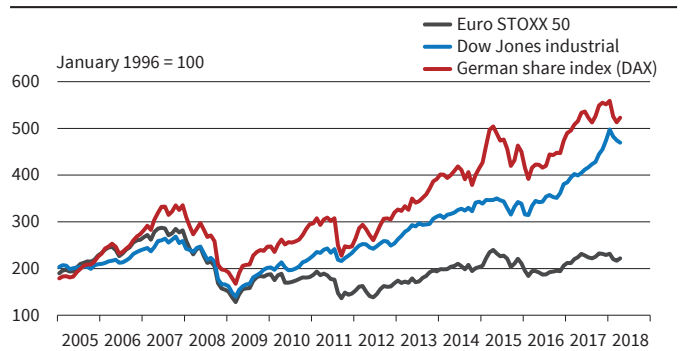


^a Weighted average (GDP weights).
Source: European Central Bank.

© ifo Institute

In the three-month period from February 2018 to April 2018 short-term interest rates remained unchanged: the three-month EURIBOR rate amounted to -0.33% in February 2018 and also in April 2018. In comparison the ten-year bond yields declined from 1.19% in February 2018 to 0.99 in April 2018, whereas the yield spread also decreased from 1.52% to 1.32% in the same period of time.

Stock Market Indices

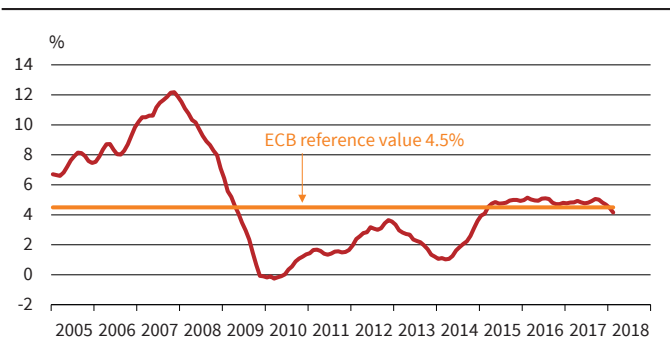


Source: Deutsche Börse; Dow Jones; STOXX.

© ifo Institute

The German stock index DAX increased in April 2018, averaging 12,397 points compared to 12,163 points in March 2018. The Euro STOXX also increased from 3,373 to 3,453 in the same period of time. Yet the Dow Jones International declined, averaging 24,304 points in April 2018, compared to 24,560 points in March 2018.

Change in M3^a

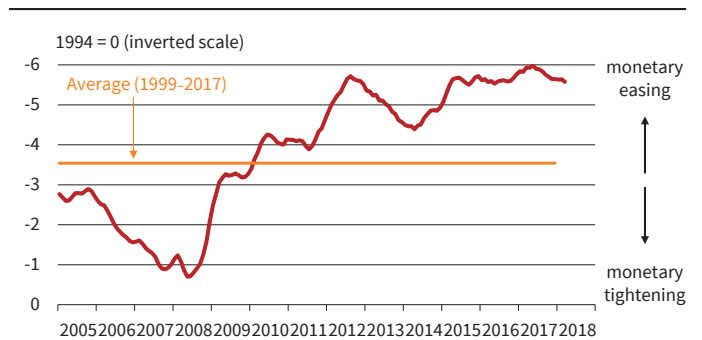


^a Annual percentage change (3-month moving average).
Source: European Central Bank.

© ifo Institute

The annual growth rate of M3 decreased to 3.7% in March 2018, from 4.2% in February 2018. The three-month average of the annual growth rate of M3 over the period from January 2018 to March 2018 reached 4.2%.

Monetary Conditions Index



Note: MCI index is calculated as a (smoothed) weighted average of real short-term interest rates (nominal rate minus core inflation rate HICPI) and the real effective exchange rate of the euro.
Source: European Central Bank; calculations by the ifo Institute.

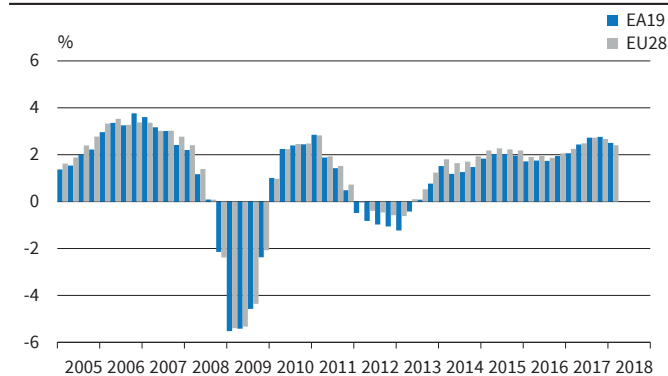
© ifo Institute

Between April 2010 and July 2011 the monetary conditions index remained rather stable. This index then continued its fast upward trend since August 2011 and reached its first peak in July 2012, signalling greater monetary easing. In particular, this was the result of decreasing real short-term interest rates. In May 2017 the index reached the highest level in the investigated period since 2004, but its downward trend thereafter continued also in March 2018.

EU Survey Results

Gross Domestic Product in Constant 2010 Prices

Percentage change over previous year



Source: Eurostat.

© ifo Institute

According to the Eurostat estimates, GDP grew by 0.4% in both the euro area (EA19) and the EU28 during the first quarter of 2018, compared to the previous quarter. In the fourth quarter of 2017 the GDP grew by 0.7% in the euro area and by 0.6% in the EU28. Compared to the first quarter of 2017, i.e. year over year, seasonally adjusted GDP rose by 2.5% in the EA19 and by 2.4% in the EU28 in the first quarter of 2018.

EU28 Economic Sentiment Indicator

Seasonally adjusted



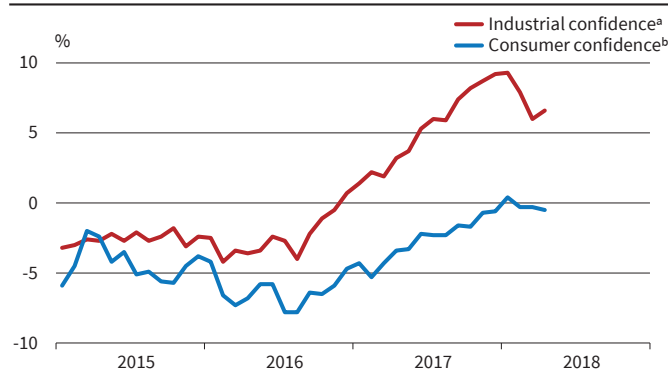
Source: European Commission.

© ifo Institute

In April 2018 the Economic Sentiment Indicator (ESI) remained unchanged in the euro area (at 112.7 points) and broadly stable in the EU28 (-0.3 points to 112.3). In both zones the ESI stands above its long-term average.

EU28 Industrial and Consumer Confidence Indicators

Percentage balance, seasonally adjusted



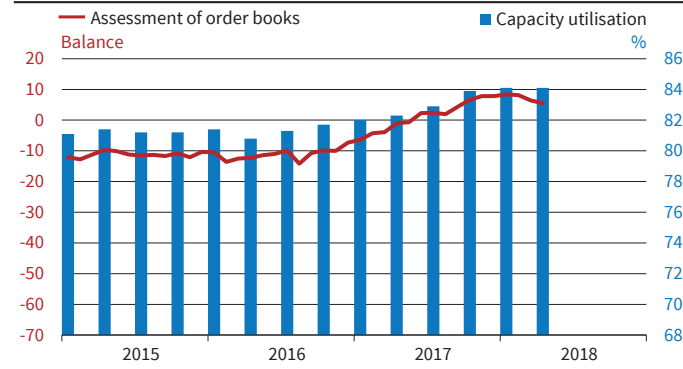
Source: European Commission.

© ifo Institute

In April 2018, the *industrial confidence indicator* increased by 0.6 in the EU28 and by 0.1 in the euro area (EA19). The *consumer confidence indicator* increased by 0.3 in the EA19, but decreased by 0.5 in the EU28.

- a The industrial confidence indicator is an average of responses (balances) to the questions on production expectations, order-books and stocks (the latter with inverted sign).
- b New consumer confidence indicators, calculated as an arithmetic average of the following questions: financial and general economic situation (over the next 12 months), unemployment expectations (over the next 12 months) and savings (over the next 12 months). Seasonally adjusted data.

EU28 Capacity Utilisation and Order Books in the Manufacturing Industry



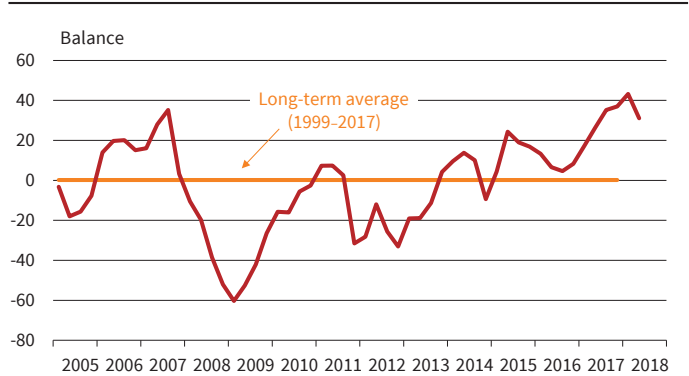
Source: European Commission.

© ifo Institute

Managers' assessment of *order books* reached 5.5 in April 2018, compared to 6.4 in March 2018. In February 2018 the indicator had amounted to 8.1. Capacity utilisation reached 84.1 in the second quarter of 2018, remained unchanged compared to the first quarter of 2018.

Euro Area Indicators

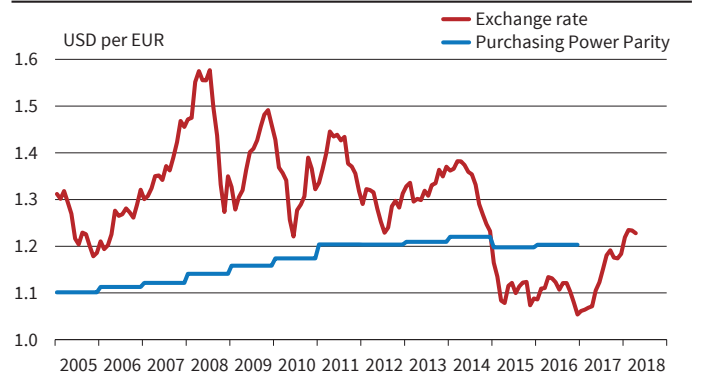
ifo Economic Climate for the Euro Area



Source: ifo World Economic Survey (WES) II/2018. © ifo Institute

The ifo Economic Climate Indicator for the euro area (EA19) cooled down from 43.2 balance points to 31.1 balance points in the second quarter of 2018, after reaching its highest level since 2000 in the first quarter of 2018. Experts continued to assess the current economic situation as very good, but scaled back their expectations significantly. The economic upturn will slow down as a result.

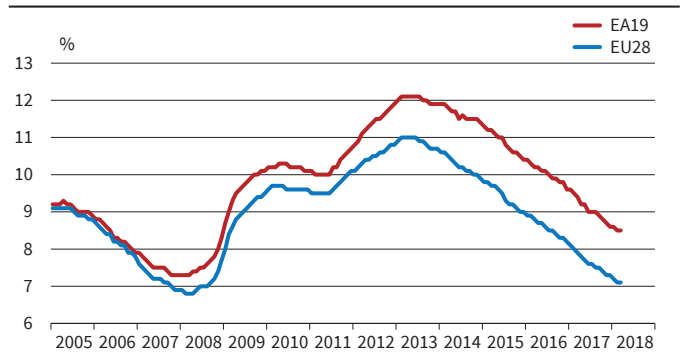
Exchange Rate of the Euro and Purchasing Power Parity



Source: European Central Bank; OECD; calculations by the ifo Institute. © ifo Institute

The exchange rate of the euro against the US dollar averaged approximately 1.23 \$/€ between February 2018 and April 2018. (In January 2018 the rate had amounted to around 1.22 \$/€.)

Unemployment Rate

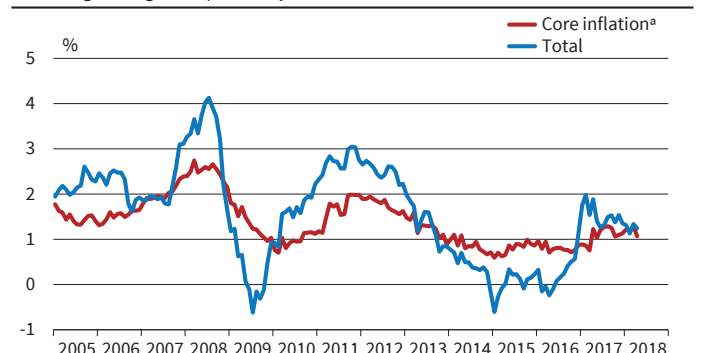


Source: Eurostat. © ifo Institute

Euro area (EA19) unemployment (seasonally adjusted) amounted to 8.5% in March 2018, stable compared to February 2018. EU28 unemployment rate was 7.1% in March 2018, also stable compared to February 2018. In March 2018 the lowest unemployment rate was recorded in the Czech Republic (2.2%), Malta (3.3%) and Germany (3.4%), while the rate was highest in Greece (20.6%) and Spain (16.1%).

Inflation Rate (HICP)

Percentage change over previous year



^a Total excl. energy and unprocessed food. Source: Eurostat. © ifo Institute

Euro area annual inflation (HICP) was 1.2% in April 2018, down from 1.3% in March 2018. Year-on-year EA19 core inflation (excluding energy and unprocessed foods) amounted to 1.1% in April 2018, again down from 1.3% in March 2018.