

# Stylized facts on the interaction between income distribution and the great recession

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## 1. Object and outline of the paper

This paper investigates whether there is a relation between the differences in the depth of the financial crisis across countries and the level of income distribution (at the start of the crisis) and/or the change in the distribution in the upcoming phase of the crisis using a sample of 37 mainly industrialized countries. There is a lot of empirical evidence that the performance of countries in the crisis differed widely – with some countries experiencing no loss in GDP, others losing one fifth of its output (Aiginger, 2010A, 2011). There is evidence how labor market performed differently in the crisis (absolutely and relative to output loss). As far as income distribution is concerned there are several hypotheses claiming that declining wage rates or the increasing polarization of incomes contributed to the crisis (similar claims exist for the Great Depression in the 20s of the last century). But up to now there is no investigation whether the cross-country differences in functional or personal income distribution and its change prior to the crisis were reflected in the depth of the crisis in the individual countries.

The paper is structured in the following way. In the next section we describe hypotheses how the changes in income distribution over the past one or two decades may have contributed to the occurrence of the financial crisis and what evidence is presented so far. In section 3 we introduce the data we use in this paper, the countries for which an investigation is feasible. We define "output performance" aggregating information on GDP into one indicator. Similarly we aggregate different aspects of income distribution into two indicators, one indicator for the level and another for the change of distribution. The next section presents the main stylized facts. Then we test robustness using single indicators instead of the principle component indicators, adding intervening indicators which had proved as relevant in studies explaining the output performance of countries in the crisis. We finally discuss how distribution can have contributed to the crisis without reflection in cross-country evidence and conclude.

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## 2. Hypothesis on the connection between income distribution and the Financial Crisis

A "classical" assertion that rising inequality in the US had been crucial for the Great Depression of the twenties comes from Galbraith 1997 (first published in 1954). After rejecting some of the standard explanations for the Great Depression- Galbraith names five weaknesses which made the economy in the twenties "profoundly unsound". As first weakness he ranks "bad" distribution of income; "the rich were indubitable rich". Therefore the economy depended on investment and luxury consumption, both fluctuating widely (in contrast to traditional consumption goods).<sup>1</sup> This argument thus stresses that inequality increases volatility since it favors demand components with large amplitude.

Another reason why income dispersion may lead to crises stems from a variant of the underconsumption or underinvestment hypothesis. With increasing productivity and stagnating wages, the wage share falls and firms would have to invest progressively in physical capital as to prevent effective demand from falling below supply. Additionally with higher polarization of incomes the consumption decreases out of a given income (since consumption as share of income decreases for higher incomes).

Several authors follow one of these three lines in explaining the Financial Crisis. Stiglitz claims that money had gone from those who would spend it to those who are so well off that "try as they might cannot spend it". Floods of liquidity (from abroad or from the rich) then lead to reckless leverage and risks. Fitoussi and Stiglitz (2009) refer also to rising inequality in many countries but connect this with asymmetric globalization (greater liberalization for capital relative to labor markets). Fitoussi and Saraceno (2010) blame increasing inequality (over decades) for slow growth in demand, which had to be countered by expansionary monetary policy, which then lead to high return of investment for people profiting from redistribution (and the expectation that increasing asset prices were sustainable)

*Rajan* (2010) directly links increasing inequality and stagnating wages with the political pressure on Fannie Mae and Freddie Mac to provide cheap credit and loose supervision for low income people in the US. If wages were not increased but low income people aspired higher standard of livings, low interest rates were a politically accepted solution. Improving education would be preferable in the longer run, while offering cheap credits was attractive in the short run and for maximizing votes. Van Treck argues along in the same line, that incomes of low income people were stagnating, aspirations not. Atkinson calls this a variant of relative income hypothesis (people want what richer ones already possess). For similar arguments see also *Horn et al.* (2009).

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<sup>1</sup> The other four "weaknesses" Galbraith stresses are bad corporate structure (holding companies etc), a financial sector with many fragile independent banks creating and supporting overleveraged consumer, the dubious stage of foreign balance, with US tuning to a net credit position, and gold standard leading to gold inflow in US and shortage in European countries, and last but not least the poor state of economic intelligence (governments focusing on balanced budgets and afraid of inflation in a period of depressed demand and deflation)

*Stockhammer* (2011) argues that the financial crisis has been the result of the interaction of deregulation of the financial sector and the polarization of income distribution. Income distribution had shifted to the disadvantage of wages (by approximately 10 percentage points) in many continental European countries in the pre-crisis period, while polarization of individual incomes had been more prominent in the Anglo-Saxon countries. Some statistical facts may bridge this difference: polarization of individual incomes to a large degree originated in extra high incomes of managers, if these would be added to profits the labor share would fall also in the UK and the US. A consequence of income polarization would have decreased consumer demand which would *ceteris paribus* then have reduced aggregate demand. Policies to mitigate this drag were in some countries fostering credits (credit driven growth), in others to boosting exports (Germany). Credits were encouraged by financial deregulation, and supported by property bubbles and capital inflow from countries with export surplus (*Stockhammer, 2011*); we may add lower interest rates due to European integration (specifically in peripheral countries), financial innovations or increasing government deficits as other strategies to counteract falling consumer demand.

Thus many authors analyzing the causes of the crisis in the US refer to the specific policy reaction of the US government, which is characterized by *Kumhof, Ranciere* (2010) as increasing incomes for the rich and leverage for the poor. In Europe Spain and Iceland experienced property bubbles too, not so much stimulated by specific economic policies addressing low income people, but as consequence of capital abundance of banks and low interest rates. Interest rates were specifically low in southern European countries, as compared to historical high inflation and nominal interest rates in Italy, Greece and Spain. After the introduction of the Euro the Southern European countries experienced the first time interest rates below expected inflation.

We mentioned already that other countries stabilized aggregate demand by increasing export surpluses (Germany, Austria, and Netherlands). Economic policy supported this specifically in Germany by restraint in wages and deregulating the labor market (e.g. by the so-called Hartz measures), and conditioning unemployment payments on acceptance of very low paid jobs.

Palley 2011 does not list distribution as cause of the financial crisis, but gives the main culprit for the crisis to the regime change of economic policy in the US: it changed from stabilizing the labor market to combating inflation and stabilizing the financial markets (after deregulation). Cheap credit policy for homeowners was needed (and property bubbles followed) to prevent economic growth from fading out.

On the skeptical side - as far as distribution as a cause of crises is concerned - are *Acemoglu* (2011) and *Atkinson et al.* (2012). The latter stress that the rise in inequality before 2007 was not reflected in consumption inequality and that poverty rates and the Gini measure of household income distribution increased only very moderately in the ten years before the crisis. Analysts should also distinguish between the question whether the "level" of inequality or its *rise* should be seen as cause of the crisis, and also that we should distinguish between

inequality as "cause" of the crisis from the possibility that rising inequality and the crisis were both jointly caused by third factors ("co-determination"). It could be that assets bubbles and performance payment were the causes of inequality. This is supported by data showing that one of the forces of rising inequality were the skyrocketing of the very high incomes and these were to a large extent determined by asset prices and performance pay schedules (bonuses). *Atkinson et al.* stress furthermore that data were more collected with the eye on comparability over time and not across countries, limiting the testing of the level hypotheses. Collecting evidence on 24 respectively 36 crises, he found that inequality was increasing before consumption dropped in only 9 cases (out of 36 cases; with 2 falling, 15 stable, 10 not classifiable) and in also in 9 of 24 GDP collapses. Thus only limited support for the increase hypothesis exist, if a "smoking gun" is found only in a third of the cases". *Bordo and Messner* (2011) also reject that income distribution lead to credit booms and financial crisis. Low interest rates and economic expansions are the only two robust determinants of credit booms in their data set,

Another line of literature investigates the effect of the crisis on poverty and income distribution (reverse causality). Since real time data for consequences of the crisis on distribution and poverty are still rare, *Habib et al.* (2010) use simulations. These show the predicted increase in poverty and income polarization, with some interesting features: the crisis impact more on skilled and rural individuals than the chronically poor.

Summarizing this section, there are many theories which "connect" the crisis to falling effective demand due to increasing inequality. Rising inequality may come from decreasing wage share or from larger polarization within wages. Other theories stress the policy reactions which stabilized growth in the short run but destabilized it in the longer run. Policy reactions to stabilize growth in a period of under-investment or under-consumption included expansionary monetary policy encouraging cheap credits or liberalization leading to new financial products. Foreign trade equilibria were mounting, since they were not reduced by allowing currencies to appreciate (China vs. US) or even fostered by export lead strategies (Germany). Wage increases below productivity and specifically that of wages of the lower third made policy reactions popular which channeled cheap credits also to the poor (instead of increasing wages or reducing unemployment). In some European countries similar trends were given but with a focus on deregulating part time and irregular contracts, or by cheap credits in countries with a history of inflation and high interest rates. The increasing dispersion of wages, was partly compensated by cheap credits enabled by innovative financial instruments (credits in foreign currency, backed up by risky financial instruments), but this was no policy for the lower income segment only. Stabilization of demand by increasing export surpluses (by wage restraint) was already mentioned.

On the empirical side we found no single cross country study relating the depth of the crisis to the level or change of income distribution before the crisis. This lack of literature holds for falling wage shares as well as increasing polarization of household incomes. *Atkinson's*

explanation that distribution data were gathered with the eye on comparability over time might be one reason for this.

### **3. The data used and the method to extract a maximum of information**

#### *The Sample*

Our sample covers 37 European and non European industrialized countries including Turkey and Mexico, China and India (even if for the latter some data on income distribution are not available).

#### *The depth of the crisis*

The depth of the crisis is measured by the drop in GDP between 2007 and 2010 using different transformations and combining them via Principal Component Analysis into one indicator.

We follow *Aiginger* (2011) to extract a single variable for output performance from different output indicators. We use the same technique to extract one variable for the income distribution level at the start of the Financial Crisis and a second one for changes in income distribution. Each of the three composite indicators (on output performance, on the crisis distribution of incomes ("level") and on "changes" in the income distribution) is derived by the Principal Component Technique. By developing this method we maximize the informational content while keeping the analysis simple.

The output performance is derived from the following four indicators:

- The rate of change of real GDP in 2009;
- The cumulated change over the three years 2008, 2009, 2010;
- The decrease of quarterly GDP from the pre-crisis peak to the in-crisis trough;
- The actual growth of real GDP in the three years 2008, 2009, 2010 relative to the "pre-crisis" growth from 2000 to 2007 ("trend change")

#### *Income distribution: level and pre-crisis change*

For the income distribution level we use three measures on inequality of personal incomes (polarization) and two measures indicating the wage share (in aggregate income).

- The Gini coefficient measures the income (net household income, after taxes and transfers) differences between all households, being zero if all have the same income and one as the maximum of inequality. For the "pre-crisis distribution level" we use data for 2005;
- The poverty rate measures the share of people with incomes less than 60% of the median income, its pre-crisis value is for the "mid 2000s";
- The inter-quintile ratio relates the incomes of the top 20% to those of the low 20% in the mid 2000s;
- The wage share is wages in total incomes for 2007;

- The adjusted wage share corrects for changes in the number of employed people, data are taken for the year 2007.

Thus all these five indicators are taken for a pre-crisis year to derive a "level" indicator. Then we construct a second indicator to measure the "change" in income distribution in some period of ten to twenty years before the crisis. For the Gini we used the change between "mid 2000s" and "the mid eighties", for poverty rate and the inter-quintile ratio the change towards the "mid nineties", for wage shares the change between 1995 and 2007. Most of these choices were caused by data availability, specifically for wage shares longer annual data are available (and tested alternatively), but in principle we thought that ten to twelve years is a good choice being longer than a typical business cycle.<sup>2</sup>

We used Principal Component Analysis (PC) to extract maximum information and minimum redundancy in constructing one indicator on the level of income distribution (PC-DISTR-L) and one for the change (PC-DISTR-C). The indicator is quantitative, technically restricted to the lie between zero and hundred. For illustration we use sometimes ranks to show whether performance ranks and distribution ranks fit together (for levels and changes of the latter).

### *Stylized facts about output performance*

The crisis was very different across countries if measured by the drop in GDP. Taking the most volatile measure – the drop of output between the highest quarterly GDP before and the lowest in crisis quarter – we find six countries in which output did not decrease (China, India, Canada, Australia, Korea, and Poland). On the other side of the spectrum, output dropped by more than 10% in Ireland, Estonia, Lithuania, and Latvia.<sup>3</sup> On (unweighted) average, the quarterly output dropped by 5.5%. Thus output decline was for world output and the sample of countries used in this paper far less than in the Great Depression in the twentieths of last century (*Aiginger, 2010A*).

Using the annual change of GDP in 2009 as indicator for output performance we have five countries with increasing GDP, and three with drops of more than 10%, the average was - 4.3%.

Trend change occurred in all countries – for seven countries it was more than 5%, for 14 countries it was less than 2%, for India only -0.1%.

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<sup>2</sup> Alternatively we tested the change in wage share from 1985 to 2007 (the correlation between 1985/2003 and 1995/2005 is 0.63).

<sup>3</sup> For some countries – e.g. Greece – the drop would be stronger if 2011 or 2012 were included.

Table 1: The output performance during the Great Recession (PC and its four components)

	Value	Rank	%	%	%	%
China	97	1	9.2	32.2	9.2	<sup>3)</sup> -1.4
India	94	2	7.6	25.4	7.6	<sup>3)</sup> -0.1
Poland	76	3	1.6	11.0	1.6	<sup>3)</sup> -0.6
Australia	71	4	1.2	5.5	1.2	<sup>3)</sup> -1.4
Korea	71	5	0.3	8.9	0.3	<sup>3)</sup> -1.5
Switzerland	66	6	-1.9	2.9	-2.4	-0.7
Canada	65	7	-2.8	1.0	1.4	<sup>3)</sup> -1.5
New Zealand	64	8	-0.4	0.7	-0.4	-2.3
Norway	63	9	-1.7	-0.6	-2.4	-1.4
Belgium	61	10	-2.8	0.3	-4.1	-1.3
<b>Top 10 in PC Output<sup>4)</sup></b>	<b>73</b>	<b>6</b>	<b>1.0</b>	<b>8.7</b>	<b>1.2</b>	<sup>3)</sup> <b>-1.2</b>
Greece	47	28	-3.2	-6.8	-3.2	-7.2
Hungary	47	29	-6.8	-4.8	-7.9	-4.1
Finland	47	30	-8.2	-3.9	-9.1	-3.2
Romania	46	31	-6.6	-1.6	-6.6	-5.7
Slovenia	44	32	-8.0	-3.4	-9.5	-4.7
Iceland	43	33	-6.7	-9.3	-6.3	-5.8
Ireland	36	34	-7.0	-10.1	-12.5	-6.7
Lithuania	20	35	-14.8	-11.1	-18.1	-8.6
Estonia	16	36	-14.3	-15.5	-19.6	-9.4
Latvia	0	37	-17.7	-20.7	-26.1	-12.0
<b>Low 10 in PC Output<sup>4)</sup></b>	<b>34</b>	<b>33</b>	<b>-9.3</b>	<b>-8.7</b>	<b>-11.9</b>	<b>-6.7</b>
<b>All countries used</b>	<b>55</b>	<b>19</b>	<b>-4.3</b>	<b>-0.4</b>	<b>-5.5</b>	<b>-3.3</b>

1) Overall indicator derived by Principal Component Analyses from four subindicators. - 2) 2010/2007 - 2007/2000. - 3) No decrease in GDP. - 4) Unweighted average. - 5) GDP decrease for 2011, 2012 not included.

Source: Eurostat (AMECO, November 2011), Oxford Econometrics Forecasts, April 2012.

### *Stylized facts about labor shares*

The share of wages in total income decreased in the majority of the countries, on average however only from 64% to 63% i.e. by less than one percentage point between 1995 and 2007. Drops by more than 5 percentage points occurred in nine countries, the highest in Norway and Germany, Austria, Slovenia and Finland. Wage share increased in sixteen

countries, the highest in Iceland, Greece and Portugal (around and more than 7%), in the Southern countries wage share had been exceptionally low in 1995 while it was high in Iceland before.<sup>4</sup>

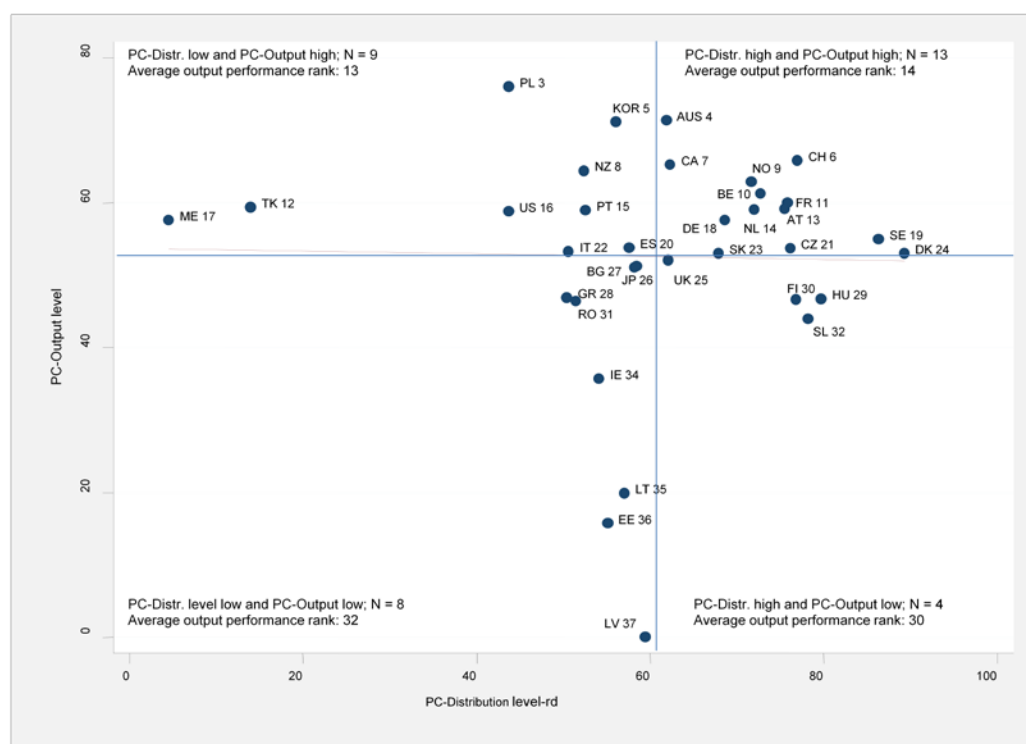
If we take wage shares adjusted by employment changes we find that adjusted wage share increased in the twelve years preceding the crisis; on average from 64% to 65.5%. It decreased strongly for the same countries (Norway, Germany, Austria) as of unadjusted wage shares and increased specifically for Iceland, Greece, Portugal, Spain and Turkey.

### *Stylized facts about polarization*

Poverty rose from 17% to 17.5% between mid 1990s and mid 2000s; increases above three percentage points occurred in Sweden and Finland where it was very low in the nineties and in Estonia, Korea and New Zealand.

The Gini coefficient increased from 0.28 to 0.31, it is the indicator signaling polarization strongest. Nevertheless there are eight countries in which the Gini decreased between mid 1980s and 2005; Turkey, Korea, Ireland, Spain, Greece (from a high inequality positions) and in Switzerland, France and Belgium (from moderate positions).

**Figure 1: The relation between output performance and level of distribution**



<sup>4</sup> The use of long data on changes in wage share seems to be important, since in some countries the wage share declined specifically strong in the eighties.



The inter-quintile ratio is about 5.3 indicating that the top 20% earned more than five times the income of the lower 20% and is marginally declining (about 0.1 percentage points). Largest increases are shown for US and Canada, Finland, Germany and Austria. Decreases were strong in Mexico, UK and Greece, all countries in which inequality according to this measure was high in the 1990s.

#### 4. The relation between distribution and output performance

The disappointing first evidence is that there is no correlation between the country hierarchy of output performance during the crisis and the level of income distribution (PC-DISTR-L) at its start. The results for the impact of changes in the distribution in the period preceding the crisis (PC-DISTR-C) are not close either, but some pattern can be detected.

##### *Correlations and stylized facts about performance and the level of inequality*

Correlating the PC-Output with PC distribution level gives no single significant results; the correlation coefficient between the output performance and the level indicator is 0.08, it is even less if we correlate the output performance with its individual components. It makes no difference if we delete outsiders, or correlate ranks instead of values.

*Table 2: The relations between output performance and distribution (level, change; overall and components)*

	Values		
	Level	Change	
PC distribution	0.08	-0.05	
Gini	0.08	-0.33	xx
Poverty rate	0.05	0.06	
Interquintile ratio	0.07	-0.01	
Wage share <sup>1)</sup>	-0.06	-0.01	
Wage share adjusted <sup>1)</sup>	-0.06	-0.01	
Wage rate long <sup>1)</sup>		-0.30	x
Wage rate long adjusted <sup>1)</sup>		-0.34	xx

<sup>1)</sup> Remark: Minus implies that output performance better for lower and decreasing wage share (more inequality) and for decreasing Ginis (less polarization).

x : significant at 5% level. – xx: significant at 10% level.

##### *Worst performers in output*

To see why this is the case let us look first at the ten countries with the worst in-crisis performance and then at the countries with the best in-crisis performance.

The low performers during the financial crisis were (according to our output performance measure and in line with literature) three peripheral European countries (Iceland, Ireland, and Greece), three Baltic countries (Latvia, Lithuania, Estonia) and three new EU member countries (Romania, Hungary and Slovenia) plus Finland. In these countries the GDP dropped more than 10% during the crisis (if the crisis is over yet).

Out of these low performing countries the Baltic countries, Greece and Ireland had high inequality at the start of the crisis, which would establish a relationship between the distribution and the depth of the crisis. However, Slovenia as well as Iceland had rather equal distribution and Hungary and Finland – two other of the low ten countries – had a very equal distribution (Finland excelled in low polarization and Hungary in high wage share). The average rank in output performance of the ten countries with the most unequal distribution in the mid 2000s was 18 (with small differences according to the four distribution indicators).

*Table 3: Output performance and distribution indicators*

*Ranked according to PC-Output*

	PC-Output		PC-Distribution level		PC-Distribution change		Gini level 2005		Gini change 2005 vs. mid 80	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
China	97	1	45	27	70	27	0.28	21	0.12	34
India	94	2	41	20	63	18	0.32	29	0.02	13
Poland	76	3	56	34	78	31	0.26	17	0.09	32
Australia	71	4	38	18	63	17	0.31	26	0.01	9
Korea	71	5	44	25	58	10	0.33	31	-0.02	4
Switzerland	66	6	23	6	58	8	0.31	25	-0.03	3
Canada	65	7	38	16	77	30	0.29	22	0.02	16
New Zealand	64	8	48	30	70	25	0.27	18	0.06	28
Norway	63	9	28	13	83	35	0.22	10	0.05	26
Belgium	61	10	27	11	58	9	0.27	20	0.00	8
<b>Top 10 in PC Output<sup>1)</sup></b>	<b>73</b>	<b>6</b>	<b>39</b>	<b>20</b>	<b>68</b>	<b>21</b>	<b>0.29</b>	<b>22</b>	<b>0.03</b>	<b>17</b>
Greece	47	28	50	33	39	3	0.34	32	-0.02	6
Hungary	47	29	20	4	62	16	0.22	8	0.07	31
Finland	47	30	23	7	84	36	0.21	6	0.05	24
Romania	46	31	49	31	59	11	0.20	3	0.12	35
Slovenia	44	32	22	5	75	28	0.17	1	0.06	27
Iceland	43	33	9	1	17	1	0.26	16	0.04	23
Ireland	36	34	46	28	66	21	0.33	30	-0.02	5
Lithuania	20	35	43	24	66	22	0.22	7	0.12	36
Estonia	16	36	45	26	81	33	0.23	12	0.11	33
Latvia	0	37	41	19	80	32	0.23	13	0.13	37
<b>Low 10 in PC Output<sup>1)</sup></b>	<b>34</b>	<b>33</b>	<b>35</b>	<b>18</b>	<b>63</b>	<b>20</b>	<b>0.24</b>	<b>13</b>	<b>0.07</b>	<b>26</b>
<b>All countries used</b>	<b>55</b>	<b>19</b>	<b>38</b>	<b>19</b>	<b>64</b>	<b>19</b>	<b>0.28</b>	<b>19</b>	<b>0.04</b>	<b>19</b>

<sup>1)</sup> Unweighted average. - *Value*: Value of Principle component, resp. Gini. - *PC-Distribution level*: derived by Principle Components from five subindicators on level data. - *PC-Distribution change* derived by Principle Components from five subindicators for changes in distribution. - Lower ranks for better Output performance, less polarization, decreasing inequality.

Q: Gini: OECD; The Standardized World Income Inequality Database.

### *Best performers in output*

The best performers during the crisis were China and India on the one hand (for which no good data on distribution exist), then comes Poland, Korea, Switzerland, and three "liberal" OECD countries (Australia, Canada and New Zealand). Norway and Belgium complement the list of ten top countries in output performance (PC-Output-L).

Poland has a rather unequal income distribution and a low wage share, the same holds for Korea. Switzerland has medium inequality as far as individual incomes are concerned and high wage share. Australia, Canada and New Zealand rank low at least in personal income equality. Thus none of best ten performers in output (with the exception of Switzerland) belongs to the quality "champignons". Even in the hierarchies of the individual indicators top 10 places in distribution level are scarce: Switzerland has a high wage share and low poverty. On average the top 10 in output were ranked as 20 in PC-distribution level (a rank similar to the rank of the low ten).

Given these stylized facts as well as the dichotomization in top and low performers in output and their relation to distribution shows that the lack of significant correlations is no surprise. The reason for the poor correlation is that the top performers did not excel in income distribution at the start of the crisis, nor were countries with less polarization. The low performers did not start from higher income differences or from lower wage rates.<sup>5</sup>

### *No correlations between performance and overall change in equality*

If we correlate output performance with the overall indicator on distribution change we get first an even lower correlation. This is also true for the change in poverty rate as well as the change in the inter-quintile ratio. The only significant result is that output performance correlates negatively with the change of the Gini coefficient (R= 0.33 which is significant at the 5 % level).

Let us first look at the general indicator for change. Out of the top ten performers in output only two are among the top ten countries moving towards more equality, with Switzerland taking rank 8 and Belgium rank 9. Canada, Poland and Norway are top output performers which changed in the direction of more inequality at least for some indicators. In Canada both wage shares fell, and all polarization indicators increased. For Poland and Norway four of the five indicators on equality dropped. The overall position of the top performers is 21 for equality to change which is below the middle.

Out of the countries with a heavy crisis, Finland, the Baltic countries and Slovenia had severe increases in polarization as well as drops in the wage share. The overall rank for the low

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<sup>5</sup> The results do not change if we use single indicators. As expected wage share and adjusted wage share are closely correlated (R for ranks 0.97), polarization indicator too, but not so close (R between 0.7 and 0.8), while wage shares are less closely related to polarization indicators (R about 0.3).

performers is rank 20, about the same as that of top output performers indicating that correlation coefficient cannot be different from zero.

Table 4: Performance ranked according to Gini change

	PC-Output		Gini				Wage share			
	Value	Rank	Level 2005		Gini change 2005 vs. Mid 80s		Level 2007		Change 2007 vs. 1985	
			Value	Rank	Value	Rank	Value	Rank	Value	Rank
Turkey	59	12	0.41	36	-0.05	1	24.7	37	8.3	5
Spain	54	20	0.32	22	-0.05	2	65.6	17	4.0	11
Switzerland	66	6	0.28	10	-0.03	3	75.2	3	5.7	8
Korea	71	5	0.32	18	-0.02	4	61.1	27	9.1	4
Ireland	36	34	0.31	17	-0.02	5	61.6	26	-4.0	25
Greece	47	28	0.32	23	-0.02	6	47.7	34	5.2	9
France	60	11	0.29	14	-0.01	7	68.7	10	-4.3	26
Belgium	61	10	0.27	8	0.00	8	67.7	14	-1.9	20
Australia	71	4	0.32	18	0.01	9	69.6	8	-2.4	24
Denmark	53	24	0.23	1	0.01	10	78.6	2	3.5	12
<b>Top 10 for Gini decline</b>	<b>58</b>	<b>15</b>	<b>0.31</b>	<b>17</b>	<b>-0.02</b>	<b>6</b>	<b>62.0</b>	<b>18</b>	<b>2.3</b>	<b>14</b>
New Zealand	64	8	0.34	26	0.06	28	64.3	21	-5.5	27
Czech Republic	54	21	0.26	6	0.06	29	62.3	25	7.0	7
Slovakia	53	23	0.24	4	0.07	30	51.5	32	-7.1	31
Hungary	47	29	0.29	15	0.07	31	72.9	5	-1.0	18
Poland	76	3	0.35	30	0.09	32	50.0	33	-5.9	28
Estonia	16	36	0.34	27	0.11	33	66.5	15	1.0	15
China	97	1	0.40	35	0.12	34	62.8	23	-0.3	16
Romania	46	31	0.32	21	0.12	35	44.6	35	4.5	10
Lithuania	20	35	0.34	29	0.12	36	58.0	28	7.3	6
Latvia	0	37	0.36	32	0.13	37	65.4	18	16.9	1
<b>Low 10 for Gini decline</b>	<b>47</b>	<b>22</b>	<b>0.32</b>	<b>23</b>	<b>0.10</b>	<b>33</b>	<b>59.8</b>	<b>24</b>	<b>1.7</b>	<b>16</b>
<b>All countries used</b>	<b>55</b>	<b>19</b>	<b>0.31</b>	<b>19</b>	<b>0.04</b>	<b>19</b>	<b>62.8</b>	<b>23</b>	<b>-0.3</b>	<b>19</b>

Lower ranks for better Output performance, less polarization, decreasing inequality.

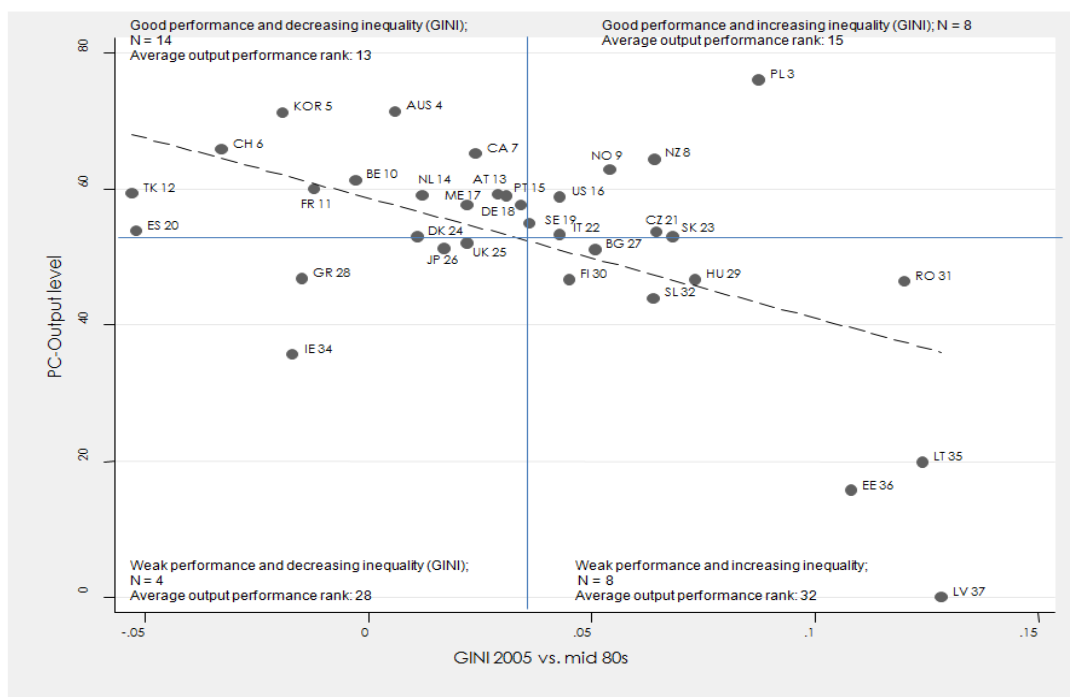
Q: Wage share: Eurostat (AMECO); Gini: OECD; The Standardized World Income Inequality Database.

*But output performance is better in countries with decreasing Gini . . .*

While output performance does not correlate with our overall indicator on changes in distribution, it is significantly related to the change of the Gini coefficient (R=0.33; significant at 5% level) indicating better output performance in the crisis if the Gini decreased between 1985 and mid 2000s.

Again we look at the countries to see why this happens. Five of the top 10 output performers have decreasing or stable Ginis (specifically Switzerland, Korea, Belgium have decreasing ones). Secondly most of the low performers had increasing inequality as measured by the Gini. The average rank in Gini change was 17 for high performers and 26 for low performers, indicating how significance came about.

Figure 2: Better output/decreasing Gini



... and worse for countries with increasing long run wage shares

The correlation between distribution change and wage ratio is inconclusive if we measure changes in the wage ratio between 2007 and 1995. If we extend the period for which the change is measured to 1985, the correlation becomes significant and negative. This implies that in countries in which the share of wages was falling, output performance was better. This relation is bolstered on the one hand by the fact that 6 out of the top 10 countries in output performance had decreasing wage shares (Norway, Poland, New Zealand, Australia, Canada, Belgium), and only two of the top had increasing wage share. On the other hand several low performers including some of the southern peripheral countries had increasing wage shares (Greece, Romania, Latvia, Spain, and Estonia).

Table 5: Performance ranked according to change of long run wage shares

	PC-Output		Gini				Wage share			
	Value	Rank	Level 2005		Gini change 2005 vs. Mid 80s		Level 2007		Change 2007 vs. 1985	
			Value	Rank	Value	Rank	Value	Rank	Value	Rank
Latvia	0	37	0.36	32	0.13	37	65.4	18	16.9	1
Iceland	43	33	0.30	16	0.04	23	93.1	1	11.5	2
Portugal	59	15	0.39	34	0.03	18	73.1	4	9.3	3
Korea	71	5	0.32	18	-0.02	4	61.1	27	9.1	4
Turkey	59	12	0.41	36	-0.05	1	24.7	37	8.3	5
Lithuania	20	35	0.34	29	0.12	36	58.0	28	7.3	6
Czech Republic	54	21	0.26	6	0.06	29	62.3	25	7.0	7
Switzerland	66	6	0.28	10	-0.03	3	75.2	3	5.7	8
Greece	47	28	0.32	23	-0.02	6	47.7	34	5.2	9
Romania	46	31	0.32	21	0.12	35	44.6	35	4.5	10
<b>Top 10 increasing wage share</b>	<b>46</b>	<b>22</b>	<b>0.33</b>	<b>23</b>	<b>0.04</b>	<b>19</b>	<b>60.5</b>	<b>21</b>	<b>8.5</b>	<b>6</b>
Poland	76	3	0.35	30	0.09	32	50.0	33	-5.9	28
Mexico	58	17	0.47	37	0.02	14	35.0	36	-6.6	29
United Kingdom	52	25	0.33	25	0.02	15	68.3	12	-6.8	30
Slovakia	53	23	0.24	4	0.07	30	51.5	32	-7.1	31
Norway	63	9	0.28	10	0.05	26	56.9	30	-7.3	32
Germany	58	18	0.29	13	0.03	19	63.3	22	-7.8	33
Austria	59	13	0.27	7	0.03	17	65.6	16	-8.0	34
Slovenia	44	32	0.23	2	0.06	27	70.6	7	-8.8	35
Sweden	55	19	0.23	3	0.04	20	71.6	6	-10.7	36
Finland	47	30	0.25	5	0.05	24	65.0	19	-11.8	37
<b>Low 10 increasing wage share</b>	<b>56</b>	<b>19</b>	<b>0.29</b>	<b>14</b>	<b>0.05</b>	<b>22</b>	<b>59.8</b>	<b>21</b>	<b>-8.1</b>	<b>33</b>
<b>All countries used</b>	<b>55</b>	<b>19</b>	<b>0.31</b>	<b>19</b>	<b>0.04</b>	<b>19</b>	<b>62.8</b>	<b>23</b>	<b>-0.3</b>	<b>19</b>

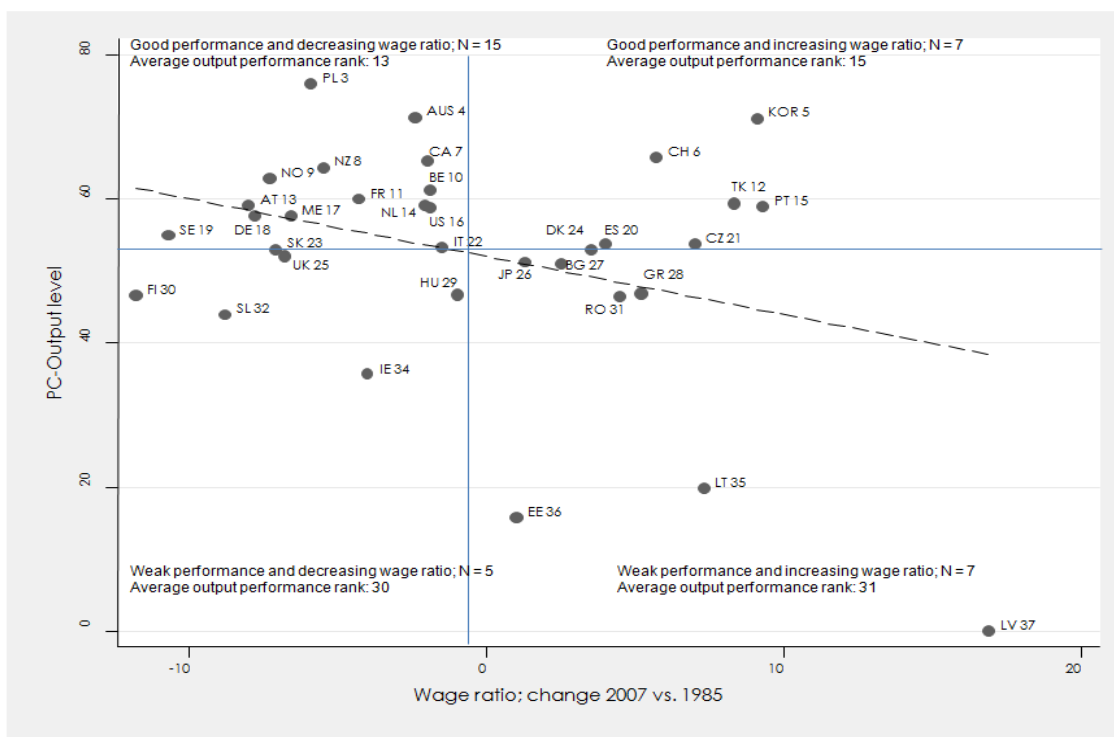
Lower ranks for better Output performance, less polarization, decreasing inequality

Q: Wage share: Eurostat (AMECO); Gini: OECD.

The result that in crisis performance of countries was better for countries in which wage shares decrease (did not increase) is a very tentative one. First it has been revealed only for the period from 1985-2007, and did not exist for the shorter period of changes in wage share between 1995 and 2007. Secondly it may hide the true causality. In countries with structural problems and shifts in global competitiveness e.g. by the entry of emerging countries into traditional markets, output growth will be slow, and given some resilience of employment and wages, wage share will increase. This again lowers competitiveness and this will be brutally revealed in a general crisis. This is discussed for the peripheral countries in Europe as

disequilibria, deindustrialization and will be reflected in negative current accounts. We know from *Aiginger (2007)* that the Current account positions in 2007 were among the three indicators (if not the strongest) explaining best the performance differences across countries during the crisis.

Figure 3: Increasing wage rate does not increase resilience



Another hypothesis connecting inequality with current account is due to *Kumhof et al (2012)*, who argue that increases in income inequality may lead to deterioration of current accounts. They claim that inequality rises due to financial liberalization, accordingly workers try and are able to take higher debt, which results in current account deficits. Specifically this may be true for English speaking countries. The overall correlation between our distribution index (PC-Distr-L) with current account balance is -0.23 for values and -0.32 for ranked data.

Table 6: Performance ranked according to current account 2007

	PC-Output		Current account		Gini		Wage share	
	Value	Rank	In % of GDP 2007		Change 2005 vs. Mid 80s		Change 2007 vs. 1985	
			Value	Rank	Value	Rank	Value	Rank
Norway	62.9	9	14.1	1	0.05	26	-7.3	32
China	97.5	1	10.8	2	0.12	34	-0.3	16
Sweden	54.9	19	9.1	3	0.04	20	-10.7	36
Switzerland	65.8	6	8.9	4	-0.03	3	5.7	8
Netherlands	59.0	14	8.5	5	0.01	11	-2.1	23
Germany	57.6	18	7.9	6	0.03	19	-7.8	33
Japan	51.3	26	4.8	7	0.02	12	1.3	14
Finland	46.7	30	4.3	8	0.05	24	-11.8	37
Belgium	61.3	10	3.7	9	0.00	8	-1.9	20
Austria	59.1	13	3.4	10	0.03	17	-8.0	34
<b>Top 10 positive current account</b>	<b>61.6</b>	<b>15</b>	<b>7.6</b>	<b>6</b>	<b>0.03</b>	<b>17</b>	<b>-4.3</b>	<b>25</b>
New Zealand	64.4	8	-8.1	28	0.06	28	-5.5	27
Portugal	58.9	15	-9.8	29	0.03	18	9.3	3
Spain	53.7	20	-10.0	30	-0.05	2	4.0	11
Romania	46.4	31	-13.6	31	0.12	35	4.5	10
Greece	46.9	28	-14.7	32	-0.02	6	5.2	9
Lithuania	19.8	35	-15.1	33	0.12	36	7.3	6
Iceland	42.7	33	-16.4	34	0.04	23	11.5	2
Estonia	15.7	36	-17.9	35	0.11	33	1.0	15
Bulgaria	51.1	27	-22.5	36	0.05	25	2.5	13
Latvia	0.0	37	-22.5	37	0.13	37	16.9	1
<b>Low 10 current account</b>	<b>40.0</b>	<b>27</b>	<b>-15.1</b>	<b>33</b>	<b>0.06</b>	<b>24</b>	<b>5.7</b>	<b>10</b>
<b>All countries used</b>	<b>54.6</b>	<b>19</b>	<b>-3.4</b>	<b>19</b>	<b>0.04</b>	<b>19</b>	<b>-0.3</b>	<b>19</b>

Q: Wage share Eurostat (AMECO); Gini: OECD.

## 5. More on robustness

We did several tests of the robustness of the results. One line was to use ranks instead of values- thus reducing the impact of extreme points. A second was eliminating outsiders directly (Iceland, China, India). We calculate principle components separately for polarization indicators and wage shares. We combined indicators on the level and the change in distribution, the results are rather robust.

One impression is that in general longer term indicators seem to have more impact on the cross country performance during the crisis than shorter ones, The Gini is that indicator on



polarization for which we have the longest data (up to eighties), changes in wage shares proves significant if we started in the eighties, not if we calculated the change towards 1995). In general we cannot say much about causality in a cross section analysis. We lagged the distribution indicators, so that reverse causality (from crisis to distribution) should be limited. However, the differences in the output growth path (e.g. between China and Italy) is very persistent so that lagging does not eliminate the possibility of reverse causality. Furthermore we know that correlations by definition connect only two variables, and do not take account of intervening forces nor reveal forces which jointly influence the two variables correlated (omitted variable bias).

An experiment to reveal the "true" impact of distribution on the depth of the crisis is to use past good practice regression, which explains the country differences in the crisis and then add the distribution variable to the best practice. We took the three main explanatory forces revealed by *Aiginger (2011)*, namely current account at the start of the crisis, crisis growth of output and crises of credit growth and added to these the level and change in distribution. Since the three variables are themselves interrelated we did this experiment for each variable separately, some of the results are shown in table 7 for the current account 2007.

*Table 7: Regression output performance (PC) on distribution (PC; components) and current account balance 2007*

Current account		Distribution level		Distribution change		Gini level		Gini change		Wage share level		Wage share change		Wage share long change		R <sup>2</sup>
tb	t	tb	t	tb	t	tb	t	tb	t	tb	t	tb	t	tb	t	
1.30	4.78 xx	0.23	1.68													0.37
1.38	5.03 xx			-0.36	-2.07 xx											0.39
1.31	4.84 xx					82.3	1.79 x									0.38
1.09	3.89 xx							-64.4	-1.20							0.35
1.21	4.46 xx									-0.19	-0.91					0.33
1.42	4.99 xx											0.93	1.98 x			0.39
1.22	3.74 xx													0.06	0.15	0.32

x: significant at 10%. - xx: significant at 5%.

The results of this experiment are neither very strong nor robust, but some tendencies can be seen. Current account in 2007 continues to be the best predictor of the output performance during the crisis insofar as its coefficient is stable and there are some combination with distribution indicators which improve the coefficient of determination (marginally) and where distribution variables are significant.

If we added PC-DISTR-L (the overall indicator on the distribution level) current account is marginally significant near the 10 % level, however with a coefficient indicating that inequality in 2007 - additionally to the current account surpluses - lead to a marginally better performance.

If we add PC-DISTR-C (the overall change indicator) to the current account indicator, we find a coefficient significant at 5 % level, indicating that decreasing inequality lead to better performance.

If we do not add the overall indicator but its components, we replicate the results for Gini (positive effect of higher level of inequality 2005, and of its decline) but it is less significant than that for the overall indicator. This is on the one hand usual for sub aggregates, on the other hand disappointing since the change in the Ginis had been significant in the correlation. For wage shares we find an (insignificant) positive impact of lower wage shares, and a positive effect of higher wage shares in the short run but not in the long run (as we found in the correlations). Thus the positive effect of lower wage shares shown in correlations seem to work via the capital account position, while the positive effect shown in regression holds only if we take current accounts as fixed.

All in all these multivariate results hint that distribution and changes in distribution may have an influence in addition to current accounts. The relation between distribution and current accounts itself is not straightforward and has to be further explored theoretically as well as empirically. We learn also that we should not overemphasize the tentative results from correlations.

## **6. Discussion and further research direction**

In general the data show us that there is no easy link between distribution and the depth of the crisis. This negative result can have different reasons

### *Data quality*

The data on distribution are known to be very imperfect. This holds for data on polarization of incomes as well as for ratios of wages to income. Data on personal income distribution refer partly to households, partly to persons, they include part time work, transfers, taxes, remittances etc. Many indicators are available only for focal years (e.g. mid nineties), and are not available annually, some were collected according to different definitions over time and across countries, for some eastern European and emerging countries even less comparable data are available (e.g. due to informal work, large share of agriculture), Wage shares may be adjusted for the number of workers, the number of firms, they may include bonus elements which mirror profits instead of fixed incomes. Some authors advocate to use data on the top incomes, since these was the group whose incomes rose quickest.

### *Econometric methods*

The limited number of data points on distribution makes the use of sophisticated econometrics difficult. The main results are derived from correlation, robustness tests are

conducted by ranking and by eliminating outliers<sup>6</sup>. We use also linear regressions. Panel econometric and strict tests of causality are not possible, and we have a single crisis in which country performance was investigated. Furthermore the crisis evolved differently in individual countries with some countries having regained pre crisis level soon while in others deviations from the growth path and pre crisis level still increase from year to year (e.g. Greece)

### *Cross section deficiencies*

Usually we are inclined to believe that the impact of conflicting determinants of an event can be carved out by comparing the hierarchy of countries for a cause with the hierarchy of the countries for the effect. If consumption affects income the changes in consumption in different countries should be strongly correlated with the changes in income, thus "proving" the impact of consumption on GDP. For income distribution and its impact on output performance in a globalized world this may not be the case. Savings produced in one country may be used for investment or government spending in other countries, consumption and investment in a country may be financed internationally

The crisis may origin from a savings glut in one country which leads to capital abundance in another. Distribution may limit consumption, but international credit flows provide cheap credits and foster consumption and housing investment. If capital is bundled in an innovative way by new instruments, savings may stabilize or destabilize growth in other countries. And if credit booms stop it may not occur proportionally for all countries but more in countries with specific weaknesses e.g. in price competitiveness, or a foreign dominated finance system.

Thus detecting or proving the causality of an important determinant of economic performance in the Financial Crisis by cross section evidence is less straightforward than for other chains between causes and effects.

### *Policy reactions and fundamental strengths*

If distributional issues reduce resilience and/or growth prospects, then economic policy can react. In the upcoming phase of the Financial Crisis at least three reactions happened: First monetary policy was rather expansionary, trying to counteract signs of diminishing growth, we may add financial liberalization which was thought to be efficient as well as growth promoting too. Secondly economic policy subsidized housing, either as policy to stabilize economic growth or as policy to enhance living standards for the poor. This happened specifically in the US, while in Europe the Monetary union provided historically unknown low interest rates for peripheral countries. Thus the effects of changes in distribution may be neutralized, or they may be deferred for some time. A third reaction has been stimulating public expenditures via sustained budget deficits and high sovereign debt (which may have been a specific policy to sustain growth or the result of permissiveness of governments in countries like Italy, Belgium, Greece).

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<sup>6</sup> China, India, Iceland.

There is also the possibility that a given change in distribution with potentially destabilizing effects had been counteracted by economic policy. And economies which have underlying fundamental problems before, may have been destabilized by a minor change in distribution, while others with high level of price competitiveness can accommodate a larger shock.

### *Research directions needed*

Therefore a lot of further research is needed. One direction is to extend the data on distribution indicators, specifically the time span for polarization indicators. We should test the impact of wage shares in a larger sample with a careful investigation of the length of time between cause and effect. The interaction between wage shares and with other variable, specifically leverage and current account position, should be analyzed in detail.

A second direction could be to look for more crises events as to investigate the impact of distribution. Further research should carefully distinguish between "level" and "change" hypothesis.

Thirdly research has to investigate how the impact of distribution on output performance depended on the specific policy reaction in which it. The reactions as well as the impact could be different according to socioeconomic system of the countries (liberal versus coordinated countries, bank based vs. finance based; emerging countries vs. developed countries, liberalized vs. controlled financial markets).

Fourthly a specifically interesting feature could be how trends between personal distribution (polarization) and functional contribution (wage vs. profit shares) relate to each other.

Last not least it may be important whether strategies regarding distribution can effect performance differently whether they are internationally coordinated or whether individual countries can improve their position at the cost of others. Increasing wages by less than productivity may have a positive impact if countries thus can "steal" market shares from neighbors, but may be suboptimal for growth in a larger region (or the world).

## **7. Summary**

There exist a lot of hypothesis that income inequality may impact negatively on the resilience of economies in general and that increasing inequality was an important cause of the recent Financial Crisis (or Great Recession) in specific. One direction stresses the underconsumption/underinvestment consequence of lower or wages or unequal distribution, the second focus on the increased volatility of an economy with lower consumption (aggravated by financial liberalization), a third group analyze the policy reactions which were done to stabilize economies in the short run but made them more vulnerable in the long run.

According to the underconsumption or underinvestment hypothesis, lower wages and higher polarization reduces demand growth and increase the gap between actual investment and

investment ("warranted investment") needed for continued economic growth. According to the volatility hypothesis, lower wages and higher polarization shifts demand to luxury consumption and investment goods which are more volatile than consumption in general, and provide a financial pool for speculation within countries or world wide – maybe in combination with financial liberalization, new innovative products and speculation needed to spend (or encouraged by the abundance of savings).

There are many empirical studies demonstrating that distribution shifted in the upcoming of this crisis as well as in the Great Depression, but there is to our knowledge no study investigating whether the crisis had been deeper/longer in countries in parallel to shifts in distribution. We fill this gap by using a general indicator for the depth of the recent crisis ("output performance", it aggregates different GDP indicators by Principle Component as to maximize informational values) and then similar indicators for the level of distribution (PC-DISTR-L) at the start of the crisis as well as changes in distribution in the upcoming period (PC-DISTR-C). The distribution indicators comprise five subindicators, two of them relating to the wage shares and three on the polarization of incomes (Gini, poverty, inter-quintile ratio).

The overall result is disappointing at the first glance. There is no correlation between the depth of the crisis in 37 countries and the level of distribution, nor with any of its five elements. This is no surprise if we look at the ten countries which performed best in the crisis: some of them having low equality, while some of the worst performers had high wage shares and low polarization. There is also no correlation between the overall change in distribution and the depth of the crisis, neither for most subindicators nor for distributional change.

Two features however come up, which deserve attention.

- Firstly, the depth of the crisis was lower in countries in which inequality as measured by the Gini coefficient decreased. The Gini is a rather comprehensive indicator not focusing at one end of the distribution and it is available for the longest period before the crisis.
- Secondly the crisis was less severe in countries in which wage share had a downward trend in the two decades prior to the crisis (2007/1985).

Both tendencies and specifically the combination of the two findings should be interpreted with care. Decreasing Gini for good performers may not have been a specific strategy which can be replicated, but may have been the result of a good long run performance of economies with decreasing unemployment and higher employment (which usually favors low income groups). Decreasing wage shares for good performers on the other hand may be the result of fast growing countries which had not adjusted the wage increases to a higher growth trend or it may be the flip side of countries which increased wages faster than productivity – overoptimistic due to EU membership and not aware of new competitors taking their role thus losing competitiveness (like the southern European countries). The results could suggest a bifurcation hypothesis to be further investigated: countries proved more stable in the financial crisis, if polarization in the incomes according to the GINI indicator decreased, and it wages did not rise faster than productivity. Both tendencies show some relation to the

current account balance, countries with negative current accounts before the crisis started performed worst in two crisis, countries with positive external balance best. Increasing wages faster than productivity lead to deficits, increasing polarization made it necessary to increase household debt, which correlated with deficits in current accounts too.

Exercises beyond correlation, stylized facts and robustness checks on the one hand support the findings; they have to caution that we should not jump to conclusions too early.

In general the effects of distribution and of distributional changes on the Financial Crisis are not easy to detect in a cross section analysis. Several countries with high or rising inequality proved rather resilient, while countries with low inequality and increasing wage shares faced deep and prolonged crises. Maybe the globalization of finance makes it more difficult to detect the country specific nexus between equality and resilience. Saving can be used to stimulate demand and speculation in other countries, investment can be financed by foreign funds, capital can first flow in one direction and "suddenly" stop in the crisis. The nexus could however also be different between wage shares and personal income distribution. And it could be different in the short and long run, between national and international strategies. The visibility of the chain between cause and effect crucially depends on policy strategies implemented to stabilize demand. Much further research is needed to carve out the fundamental relation between equality and resilience, two issues specifically high on the policy agenda after the Financial crisis and in its aftermath. .

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