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STYLIZED FACTS ON BUSINESS CYCLES AND INEQUALITY

Virginia Maestri and Andrea Roventini

GINI DISCUSSION PAPER 30
JULY 2012

GROWING INEQUALITIES' IMPACTS

Acknowledgement

Thanks to the participants at the GINI Year 1 Conference (Milan, 4-5 February 2011), GINI Workshop WP3 Drivers of Inequality (8 October 2011), AIAS internal seminar, Francesco Bogliacino and Wiemer Salverda for their stimulating and helpful comments. All usual disclaimers apply.

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Bibliographic Information

Maestri, V., Roventini, A. (2012). Stylized Facts on Business Cycles and Inequality. Amsterdam, AIAS, GINI Discussion Paper 30

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Stylized Facts on Business Cycles and Inequality

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July 2012
DP 30





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Abstract

Business cycles are expected to contribute to drive the dynamics of inequality of countries. This paper provides new stylized facts about the relationship between business cycles and inequality. We study the cross-correlations of filtered series of inequality, on the one side, and macro-economic variables (e.g. GDP, unemployment, inflation, etc), on the other. In addition, the analysis explores the Granger causality of such relationships. We use the RED database that allows to study the dynamics of different sources and measures of inequality in a subset of OECD countries. We find that inequality series are non stationary. At the business cycle frequencies, income inequality is counter-cyclical, while consumption inequality is pro-cyclical. We find a stronger correlation of the business cycle with inequality in the hours of work than with inequality in hourly wages. We find a considerable evidence of a two-way causality macroeconomic variables, on one side, and inequality at the business cycle frequencies.

Keywords: Inequality, business cycles, detrending, cross-correlations, non-stationarity, Granger causality tests.

JEL Classification: C10, D3, E32.





1. Introduction and Motivations

The debate over the mutual relationship between business cycles and inequality is an old one, but in recent years it has regained popularity in economic discourse. Researchers tried to address questions like: Do expansions benefit all segments of the income distribution? Is inequality caused by business cycles or the reverse?

In this paper, we study the relationship between business cycles and inequalities in different OECD countries in order to try to uncover new stylized facts that can allow economists and policy makers to improve their models and their policy recommendations. More specifically, we try to address the following questions. Do inequality shocks have transitory or permanent effects? What is the relationship between each source of inequality and business cycles? Which sources of inequality or which part of the income distribution are more affected by economic fluctuations? What is the relationship between inequality, on one side, and inflation, unemployment, share prices, government and private consumption, on the other? What is the causal direction of the relationship between several measures of inequality and macro variables in different countries? Are there common patterns across different countries or are there country specificities?

The contribution of this paper is threefold. First, we consider the relationship between business cycles and macroeconomic variables, on one side, and different sources, measures of inequality and parts of the distribution, on the other. Second, we use a novel database on inequality (RED) for some OECD countries. Finally, we perform Granger tests in order to assess the causal order between inequality and macroeconomic variables.

Empirical studies on the behavior of inequality during the inter-war years show that income inequality followed a counter-cyclical pattern: upper income groups made strong relative gains during the Depression. However, for post-war years results are mixed: some authors find support for the counter-cyclical patterns, others do not (Parker, 1999). Gains and losses associated with the business cycle are not uniform along the income distribution (Hoover et al., 2009). Moreover, recessions and expansions have asymmetric effects on income inequality (Hoover et al., 2009). In particular, recessions generally increase income inequality as they raise unemployment and increase the dispersion of hours worked (Krueger et al., 2010). The reason is that household earnings are procyclical at each percentile, but business cycle fluctuations are much more severe at the bottom of the distribution (Heathcote et al., 2010).

Most of the studies about inequality focus on income inequality. Nonetheless, the effect of business cycles on other sources of inequality may be different. For instance, business cycles do not necessarily affect wage inequality. Besides, wage inequality provides a partial picture: since low skilled workers are disproportionately laid off

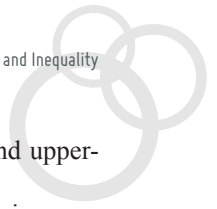
during recessions, their earnings may not need to be reduced. Labour market institutions may prevent wages to adjust to business cycles.

Krueger et al. (2010) find smaller counter-cyclical effect of business cycles on consumption inequality, due to the life-span smoothing of consumption. Another reason is the smaller counter-cyclical pattern of disposable income inequality due to automatic stabilizers. Indeed, the cross-country variability in the relationship between business fluctuations and consumption inequality reflects the cross-country variability of automatic stabilizers (Krueger et al., 2010).

Business cycles may affect wealth inequality as they may have an impact on asset prices (i.e. housing and stocks) and wealth accumulation. However, Krueger et al. (2010), based on studies with Italian and Swedish data, report no effects of business cycles on wealth inequality.

Barlevy and Tsiddon (2006) “challenge” the empirical findings that recessions spur inequality. They argue that downturns amplify long-run trends in (wage) inequality. Since most of inequality studies focus on a period of long-run increase in inequality (e.g. from the 1950s in the US), this is the reason why these studies find a correlation between recessions and increases in inequality. Barlevy and Tsiddon (2006) base their descriptive evidence on selected data compiled by economists writing about the Great Depression and archives of economic historians on aggregate wages in some category of jobs, from which they distinguish between skilled and unskilled workers, and show that recessions between the 1920s and the 1950s decreased wage inequality. Nonetheless, wage ratios between skilled and unskilled occupations do not necessarily imply an overall compression of wage inequality, let alone a reduction in top wage shares (Piketty and Saez, 2007). Indeed, Piketty and Saez (2007) by using corporate tax returns for the US show that the richest part of the middle class benefited in relative terms from the Depression. The issue of whether wage compression did occur during the interwar period is still open. Barlevy and Tsiddon (2006) follow the same reasoning for top-income inequality during the inter-war period. Piketty and Saez (2007) show that top income inequality was on a downward trend during the interwar period. They explain this as a result of capital shocks and attribute the decline to the fall in capital income rather than to a fall in top wages.

Unemployment and inflation may have contrasting and independent effects on economic inequality. The impact of unemployment on inequality is clearcut, although the effect may be different on different sources of inequality (hours of work, hourly wages, etc.). The cyclical effect of unemployment is found to increase income inequality: the income share of the top quintile increases with respect to the share of the lowest one (Parker, 1999). The effect of inflation on economic inequality is less obvious. The inflation channel may affect the inequality of (disposable) income via: i) the cost of living, as different income groups may have different bundles; ii) a wealth



effect, as inflation redistributes net worth from the highest and lowest income groups to the middle and upper-middle ones; iii) a tax effect, as increasing nominal income move taxpayers to higher tax brackets; iv) an income-source effect as lags in the adjustment of indexed incomes lead to a redistribution toward earners who can adjust more rapidly to inflation.

Overall, the evidence supports a modest inverse relationship between inflation and inequality (Parker, 1999). The lowest quintile tends to benefit more from inflation, while for the top ones results are more mixed. However in many studies the coefficients of the cyclical variables are not significant. Recent political economic literature suggests a reversed causation from inequality to inflation. For instance, Beetsma and Van der Ploeg (1996) argue that democracies in which there is a large fraction of poors and few rich rely more often on fiscal policies based on monetary expansions.

Moving to the long-run relationship between inequality and income growth, Herzer and Vollmer (2011) find a negative effect of income inequality on per-capita income for 46 countries. Voitchowsky (2005) underlies the importance of the shape of the income distribution as determinant of economic growth.

Recently, a new strand of literature (Fitoussi and Saraceno, 2010; Kumhof and Ranciere, 2010; Stiglitz, 2011) claims that at the origin of the current downturn was a high level of inequality that, in Anglo-Saxon countries pushed low-income households to increase their debt in order to stabilize consumption, thus inflating the bubble in financial markets.

On a country-specific base, the special issue “Cross sectional facts for macroeconomists” of the Review of Economic Dynamics (2010) provides descriptive analysis on the relationship between business cycle and inequality for a set of OECD countries. For the UK, Blundell and Etheridge (2010) observe a surge in gross income inequality after the two significant recessions of the early ‘80s and early ‘90s, driven by a fall in the lower quantiles of the income distribution. As for other countries, inequality shows an upward trend, particularly pronounced after periods of recession. Data for Spain show that the fall in income inequality during the economic expansions of the ‘80s and early ‘90s is substantially larger than the fall in consumption inequality. Nonetheless, consumption inequality did not fall after the recovering that followed the 1993 recession (Pijoan-Mas and Sanchez-Marcos, 2010). This fact suggests that different expansions may generate different effects on inequality in terms of magnitude and that the effect of business cycles on permanent and transitory income may not have the same size. With US data, Heathcote et al. (2010) find an effect of business cycles on earnings inequality, but not on wages. They attribute this finding to the cyclicalities of labour supply and, in particular, to unemployment. On the other hand, for Italy Jappelli and Pistaferri (2010) conclude that changes in income inequality are not driven by changes in unemployment.

They point out that changes in income inequality may be related to structural changes in the labour market of the late '80s and '90s. Domeij and Floden (2010) suggest that growing Swedish earnings inequality in the '90s was due to an increased volatility of persistent shocks. Brzozowski et al. (2010) confirm the permanent role played by recessions in increasing inequality for Canada. Fuchs-Schundeln and Sommer (2010) document the upward jump in inequality after Germany reunification.

The rest of the paper is organized as follows: in Section 2 we present the statistical techniques we use in our study. Section 3 describe the data. We present the empirical results in Section 4. Finally, in Section 5 we conclude



2. Methodology

The analysis of the statistical properties of inequality and more generally of macroeconomic series at business cycle frequencies requires the adoption of filters to remove trends and high frequency noise from the data. In this way, one can focus on the short-to-medium run frequencies which are usually associated to the business cycle component of the series. Many procedures have been developed to accomplish this task, such as linear trend removal, first differencing, the Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1981), and the bandpass filter (BP) (Baxter and King, 1999). In line with the business cycle literature (Kydland and Prescott, 1990), in this study we will apply the HP filter.

Before filtering the series, we perform a battery of stationarity tests (i.e. Dickey-Fuller tests). In the macroeconomic literature, it is well known that GDP and many other macroeconomic series are difference stationarity, i.e. they possess a unit root, implying that shocks have permanent effects. The results of such tests could have important consequences for understanding the properties of inequality series. For instance, if inequality series have a unit root, they could possess an increasing trend which changes the first moment of the process.

We measure the amplitudes of fluctuations of (filtered) inequality series comparing their standard deviations with the ones of the GDP. In this way, one can classify inequality indexes according to whether they are more or less volatile than the business cycle.

We then study the comovements at business cycle frequencies between inequality and other macroeconomic time series (e.g. output, inflation, unemployment, etc.) computing cross-correlations. More specifically, we compute correlations between inequality series at time t and macroeconomic variables from time $t-3$ to time $t+3$. The cross-correlations between inequality and output are particularly important: the sign of the highest correlation determines whether inequality is pro-cyclical or counter-cyclical, while the timing of the highest correlation indicates whether inequality leads, follows or is perfectly synchronized with the cycle (e.g. if the highest correlation is at time $t-1$, the inequality index is said to follow the business cycle).

Finally, we try to shed some light on the causal relationships between inequality and macroeconomic series by performing Granger causality tests (Granger, 1969). An inequality series is said to Granger-cause a macroeconomic one, if the past and current data on inequality contribute to better predict the future value of the macroeconomic variable given its current and past values. More formally, given two generic time series X and Y , we regress ΔX on its lagged values and then we add the lags of ΔY . Then, we use F-tests to assess whether the inclusion of lags of ΔY adds explanatory power to the model. The null hypothesis of no Granger causality is rejected if lagged values

of ΔY are retained in the regression. Then the same exercise is repeated using ΔY as dependent variable and ΔX as candidate series. Note that in this way one could find that both variables Granger-cause each other. In order to have more precise results, we also compare the two marginal R2 obtained by regressing ΔX on ΔY and vice-versa (more on that in Stock and Watson, 1999). The marginal R2 is the difference between the R2 of the regression of a variable on its lagged values and on the lagged values of the candidate series minus the R2 of the regression of the same variable on just its lagged values. The highest marginal R2 suggests which of the two variable is more likely to Granger-cause the other. Note finally that Granger causality does not necessarily mean economic causality. For instance, a variable might help to predict GDP growth not because it drives GDP growth, but just because it embeds some information on a third variable which is the “real” determinant of GDP growth.



3. Data

We use secondary data of inequality collected by the authors of the special issue “Cross-sectional facts for macroeconomists” of the Review of Economic Dynamics (RED database). We believe that the RED database overcomes some of the main pitfalls of secondary data. For instance, Atkinsons and Brandolini (2001) warn about the shortcomings of secondary data on inequality such as the World Income Inequality Database (WIID), which is an assembly of inequality indexes from different sources without an agreed basis of definitions.

The RED database has several advantages with respect to secondary data such as WIID. First, the authors of the RED database followed the same guidelines for the construction of inequality indicators, although these inequality indicators are based on national surveys. Note that for the cross-correlation analysis carried out in this paper, we need data consistency within countries and not necessarily across countries. Indeed, correlograms, as well as Granger causality tests, are computed separately for each country. Moreover, national surveys allow to have considerable long series of inequality based on reliable data. Finally, the RED database contains measures of different sources and indexes of inequality.

The sources of inequality includes: hours of work, hourly wages, earnings, market income, disposable income, consumption and wealth¹. Business cycles and, more in general, macroeconomic variables, may have different effects on different sources of inequality. For instance, consumption is known to adjust more smoothly than income. It is also interesting to see whether and where recessions have a stronger relationship with hours of work or with hourly wages².

As for the sample considered, we selected RED indicators based on male individuals for hours of work and hourly wages (with the exception of Canada for which it was not available) and based on the households for earnings, gross and net income, consumption.

The indexes of inequality covered by the RED database are: the well-know Gini coefficient, the ratio between the 90th and 50th percentile ($P_{90}=P_{50}$), the ratio between the 50th and the 10th percentiles ($P_{50}=P_{10}$) and the variance of logs (varlog). Different indexes of inequality are not a mere refinements of one another, but they allow to grasp inequality at different parts of the income distribution. For instance, the Gini coefficient is more sensitive to changes around the mode and the variance of logs to changes at the bottom of the distribution. The P-ratios

1 Nonetheless, wealth series in the RED database are too short to be considered in a time-series analysis.

2 Hourly wages in RED are imputed dividing earnings by hours of work (Krueger et al., 2010).

clearly measure the relationship between two specific parts of the distribution. A detailed description of the inequality indexes is provided in the Appendix.

The advantages of a richer dataset such as the RED come at the expenses of a dramatically smaller set of countries covered, with respect to databases such as WIID. The RED database covers Britain, Canada, Germany, Italy, Mexico, Russia, Spain, Sweden and the US. We selected the European countries plus the US, which provide continuous series of inequality for at least 20 years. This choice lead to the exclusion of Italy, as the RED series are discontinuous³ and Spain, as the series are too short. Therefore, the inequality measures used in this work cover Canada (CAN), Germany (GER), the United Kingdom (GBR), Sweden (SWE) and the United States (US). We also add data from the Netherlands (NED) obtained from the Central Bureau of Statistics⁴. The inequality series for Canada and Sweden are based on two different surveys⁵. In Table 1, we provide a detailed list of the RED inequality series employed in this study.

As for the macro-variables we use the OECD Main Economic Indicators database, apart for the GDP of Sweden that was collected from Eurostat. The macro-economic variables considered in this study are GDP, inflation, unemployment, stock prices, private and government consumption.

3 The RED data are based on the Survey of Household Income and Wealth for Italy, that is collected approximately every two years

4 Atkinsons and Brandolini (2001) warn about the change in the grossing-up method and in the income concept (now including imputed rent and health insurance premia) between 1985 and 1990 for the Dutch CBS data on the Gini coefficient. This explains the rise in inequality in that period.

5 We do not include private consumption for Germany in the analysis as the corresponding MEI serie starts in 1991.



4. Empirical findings

In this Section we present the results of our econometric analyses. We first test the stationarity of the inequality and macroeconomic series (cf. Section 4.1). We consider descriptive statistics in Section 4.2. The comovements between inequality and macroeconomic series are commented in Section 4.3. Finally, in Section 4.4 we present the Granger causality analysis.

4.1. Stationarity of series

We start checking the stationarity of macroeconomic and inequality series. Note that non-stationarity indicates that the moments of the stochastic process underlying the series change over time. We apply a battery of Dickey-Fuller tests to the macro and inequality series of each country. More specifically, for every time series (in logs with the exception of unemployment.) we perform both simple and augmented (one lag) Dickey-Fuller tests including also the drift and linear trend in the model specification.

Not surprisingly, in line with the macroeconomic empirical literature (e.g. Stock, 1994), the results of the Dickey-Fuller tests show that most macroeconomic series have a unit root (Table 2). Turning to inequality series, different specifications of the Dickey-Fuller test show that most of the series are non-stationary (see Table 2). The non-stationarity of inequality series support the qualitative evidence about the growing of inequality in the last decades in all the countries considered. It also suggests that shocks have permanent effects on inequality series.

The hypothesis of permanent effects of shocks to inequality has serious policy implications. In fact, macroeconomic factors deemed to have a temporary impact on inequality may, instead, have long-lasting effects. In the last decades, income inequality kept rising. A plausible interpretation of this fact is that downturns have adverse permanent effects on the level of inequality. This hypothesis is supported by the analysis of Hoover et al. (2009), in which they study the asymmetric effects of the cycle on inequality. They find that a positive shock to unemployment increases income inequality for three years longer than the reduction of inequality following a negative shock. Nonetheless, this finding is in contrast with Jacobson and Giles (2006) who find Gini series in the US to be stationarity in post-war years.



4.2. Descriptive statistics

We compute the volatility of different sources and measures of inequality series. Table 4 reports the standard deviations of HP-filtered inequality series. As a general pattern across-countries (with the exception of Germany), we notice that the cyclical fluctuations of earnings and market income inequality are more volatile than those of disposable income and consumption inequality. We expect inequality measured at the individual level (hours of work, hourly wage, earnings) to be more volatile than inequality measured at the household level (income, consumption).

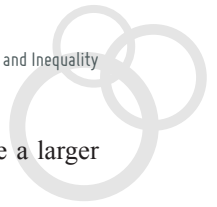
As for the indexes, inequality measured by the Pratiós shows a high degree of volatility with respect to the other indexes. This may be due to the noise of “extreme” values of the distribution such as those of the 10th and 90th percentiles, or it may stem from the high income volatility accruing to the tails of the distribution. Among all the indexes of inequality and across all sources of economic inequality, inequality measured with the Gini coefficient is more stable than inequality measures with varlog and much more stable than inequality measured with the Pratiós. This finding may be due to the fact that changes in inequality occur mostly around the tails than around the mode of the distribution.

The relative volatility of different sources of income inequality depends on the index chosen to measure inequality. This fact shows that changes in inequality of different sources of income occur at different points of the distribution.

For instance, in Canada market income is the most volatile, while disposable income is the least volatile among the income sources. By measuring inequality with the variance of logarithms, earnings inequality turns out to be as volatile as market income. However, according to the Gini coefficient earnings inequality is as volatile as disposable income. This result suggests that changes in earnings inequality are more pronounced at the bottom than around the mode of the distribution.

For Germany, the volatility of inequality series does not follow the general pattern found for the other countries. In fact, inequality of disposable income is found to be highly volatile and more than earnings inequality. This specificity may be due to the reunification of the country.

Earnings inequality displays a high level of volatility, especially in the UK and US. On the other hand, consumption inequality has a low degree of volatility. In the UK, hourly wage inequality has the lowest degree of volatility compared to the other income sources. Conversely, in the US the Gini index points to hourly wage



inequality as the most volatile form of inequality. This result shows that in the US hourly wages have a larger dispersion around the mode.

In general, earnings inequality is generally more volatile than hours of work and wage inequality. Since earnings is the product of hours of work and hourly wage, this might be due to a positive correlation between low wages and few hours of work.

4.3. Cross-correlations

In what follows we present the analysis of the comovements between inequality indexes and a set of relevant macroeconomic series, namely, output, unemployment, inflation rate, share prices, government consumption, and private consumption (Tables 4-38).

Output and inequality. Let us start observing the correlations between output and inequality series to study the behavior of inequality during business cycles. Inequalities in hours of work, earnings, market and net income are generally countercyclical, with the exception of Germany and of the P9050 ratio in the UK. For Germany and the UK there is some evidence that inequality in hourly wages is pro-cyclical, though in Canada it seems countercyclical.

Consumption inequality is pro-cyclical both in the UK and the US. Therefore, expansions are associated with a reduction in income inequality and, at the same time, an increase in consumption inequality. An interpretation of this finding is that the increased income accumulated at the bottom of the distribution translates into a higher propensity to save/invest and not into consumption. Conversely, reduced income at the bottom during recessions may not translate into a higher inequality in consumption, as households at the bottom of the income distribution may maintain a constant level of consumption through debt. The latter interpretation fits particularly well the UK and the US cases, whose highly developed and deregulated financial markets supported the surge of households' debts.

Business cycles generally have a stronger correlation with hours of work inequality than with hourly wage inequality, once again with the exception of Germany. Indeed, for Germany the cross-correlations between GDP fluctuations and inequality follow a different pattern: inequality in hours of work, hourly wages, earnings and market income are pro-cyclical. The inequality series for Germany are based on West Germany until 1989 and on East and West Germany afterward. This fact could contribute to explain the puzzling finding that economic inequality is

pro-cyclical. Moreover, contrary to the other countries the correlations with business cycles are stronger for hourly wages than for hours of work.

Inflation and inequality. There are many ways according to which inflation could affect inequality series. For instance, one may expect inflation to affect wage or income inequality through income indexation: people at the top of the distribution may have a stronger power to protect their income from inflation than employees. We may also expect an effect of inflation on consumption inequality as it may affect more goods that represent a larger share of the consumption bundle of households at the bottom of the income distribution. When we consider the empirical correlation between inflation and inequality series, the picture is blurred. Inequality in hours of work, earnings and market income have generally a negative correlation with inflation. Nonetheless, inequality in hours of work in the US, inequality in earnings and market income in Germany display a positive correlation with inflation. The evidence for inequality in hourly wages and net income is mixed. Inequality in hourly wages is negatively correlated with inflation in Canada and positively correlated in the UK (with the exception of the P9050). For the US, the correlation between inequality in hourly wages and inflation is not clear. Indeed, different inequality indexes give contrasting results. Inequality in net income is negatively correlated with inflation in Canada and positively in Germany, Sweden and the US. Consumption inequality has a positive correlation with inflation in UK and a negative correlation with the P9050 in the US.

Unemployment and inequality. The correlations between inequality and unemployment is more clear. The correlations between inequality in hours of work, hourly wages, earnings, net and market income are positive and the correlations with consumption inequality are negative both in the UK and the US. The first results confirm previous studies: unemployment is not proportionally distributed along the income distribution but during recessions people at the bottom are disproportionately laid-off, thus “increasing income” inequality. Nonetheless, our results show that an increase in unemployment is associated with a reduction in consumption inequality. A possible explanation is that during recessions people at the bottom of the income distribution compensate their lost income with an increase in indebtedness. This result is indeed true for the UK and the US, where people have increasingly financed consumption through indebtedness. This finding is in line with the literature suggesting that an increas-



ing level of inequality contributed to the current crisis (Fitoussi and Saraceno, 2010; Kumhof and Ranciere, 2010; Stiglitz, 2011).

Share prices and inequality. The correlations between share prices and different forms of inequality are strong and mostly negative. The negative correlation between share prices and earnings inequality can generally be explained by the negative correlation between share prices and hours of work inequality⁶. Indeed, the correlations between share prices and hourly wages are not very significant. The general findings for share prices parallel those for GDP, though the fluctuations of share prices seem to slightly anticipate those of GDP. In some cases, we find a positive association between share prices and inequality. Share prices are positively and strongly correlated with hourly wage inequality in the UK and with hours of work in Germany. In the US, an increase in share prices widens the earnings gap between the 90th and 50th percentile and it increases consumption inequality. An increase in share prices is expected to have a positive effect on income inequality, as shareholders are overrepresented at the top of the income distribution. In turn, an increase in income inequality may translate into an increase in consumption inequality, as shown by the results for the UK and the US.

Government consumption and inequality. An increase in government consumption is generally associated with reductions in inequality. In fact, government spending is expected to have a redistributive effect. Nonetheless, we find some evidence that higher government consumption is associated with higher income inequality in some European countries (Germany, Netherlands, Sweden). Note that an increase in publicly provided services corresponds to an increase in government consumption. Since most of these services are provided in-kind (health, education, housing), their inequality-reducing effect could not be fully captured by standard measures of (cash) income inequality. The different patterns of government consumption and inequality between continental European and Anglo-Saxon countries may be explained by institutional differences, which in turn affect the size, composition and dynamics of government consumption. For instance, in the three European countries included in this study, automatic stabilizers are stronger than in Anglo-Saxon ones, where discretionary fiscal policies have a stronger role.

Private consumption and inequality. As for private consumption, the tables show a general negative correlation with inequality in hours of work, earnings and market income. A European versus Anglo-Saxon pattern seems to emerge once again for private consumption and net income inequality. Indeed, private consumption is negatively correlated with disposable income inequality in Canada and the US and positively in the Netherlands and

6 Note that earnings is given by the product of hours of work and hourly wages.

Sweden. In line with the results we obtained for output, private consumption is found to be positively correlated with higher levels of consumption inequality.

4.4. Granger causality

As the last step of our empirical analysis we investigate the direction of the causation between inequality series and macroeconomic variables (i.e. output, unemployment, inflation rate, share prices, government consumption, and private consumption). We do so by performing Granger-causality tests.

GDP and inequality. The results of the Granger tests point to a mutual causal relationship between GDP and inequality in most of the countries considered. A one way causation from inequality to GDP is found for disposable income inequality in the Netherlands and Sweden, earnings inequality in the US (in particular the ratio between the 50th and 10th percentile), and all sources of inequality in Canada. In these countries, an increase in disposable income inequality may contribute to induce a recession. In few other cases, Granger tests point to a one way causation from GDP to inequality. For example, in Sweden GDP fluctuations seem to determine earnings inequality.

Inflation and inequality. We find a mutual relationship between inflation and inequality. However, in many cases it seems that inequality Granger causes inflation. We find this pattern for all the countries considered except from Canada and for disposable income. Indeed, Canada shows specific causation patterns: inflation dynamics shows a large explanatory power on inequality series. In general, inflation seems to Granger cause disposable income inequality (with the exception of the Netherlands).

Unemployment and inequality. In most of the cases, unemployment Granger-causes inequality as during recession people at the bottom of the earnings distribution are disproportionately laid off. Interestingly, the results of the Granger tests suggest that in some cases inequality causes unemployment.

Share prices and inequality. Empirical results show a two way relationship between share prices and inequality. Exceptions are Canada, the Netherlands and Sweden, where we mostly find a one way causation from inequality to share prices. In the US, inequality seems overall to Granger cause share prices, but with two notable exceptions: share prices Granger cause consumption inequality and the earning gap between the 90th and 50th percentile. In Germany and the UK we find causations in both ways. For Germany, Granger tests show that share prices cause inequality, though inequality in hours of work and, in particular, the earnings ratio between the 90th and 50th percentile, determine share prices. Similarly, in the UK, share prices explain inequality better than inequality explains share prices, with the exception of the P5010 earnings ratio.



Government consumption and inequality. Government consumption causes disposable income inequality in the Netherlands (strongly) and earnings inequality in Canada. For the UK there is a general but not very strong evidence that government consumption causes earnings inequality. In the US, the evidence is more mixed. On the one hand, the hourly wage ratio between the 50th and 10th percentile Granger causes government consumption. On the other hand, government consumption seems to determine an increase in the earnings gap between the 90th and the 50th percentile and a slight reduction in consumption inequality.

Private consumption and inequality. For private consumption Granger tests confirm the two way causality, except for the UK, where consumption seems to univocally determine inequality.





5. Conclusions

In this work we studied the properties of several inequality series at the business cycle frequencies for some OECD countries, namely the US, the UK, Germany, Sweden, the Netherlands, and Canada. More specifically, we analyze the stationarity of inequality series; we compare the amplitude of their fluctuations; we study the comovements of inequality series as to many important macroeconomic series (i.e. output, private and public consumption, inflation, unemployment, and share prices); we performed Granger-causality tests between inequality as macroeconomic series. Here, we resume our main empirical findings by way of conclusion.

To begin with, our empirical results seem to suggest that most inequality series are not stationary. Business cycles can explain transitory shocks to economic inequality, however they do not fully explain the rising trend of inequality in many OECD countries. Permanent effects of recessions on inequality and asymmetry in the effects of recessions and expansions could be a candidate explanation for reconciling short-term fluctuations of inequality with its long-term upward trends. Besides, structural changes (e.g. labour market in Italy as mentioned by Jappelli and Pistaferri, 2010) can have a major role in explaining the observed trends in inequality. Beyond structural reforms and long-term trends, this study shows that short-term fluctuations of the economic activity do have an effect on inequality fluctuations.

Moving to the volatility of inequality series, a first glance at the short-term movements of inequality series shows that cyclical fluctuations of earnings and market income are more volatile than those of disposable income and consumption inequality. This could be explained by the smoothing effect of automatic stabilizers and increasing levels of household debt for consumption inequality. We also find that economic inequality measured with the Gini coefficient is generally less volatile than if measured with varlog or Práticos. This finding suggests that changes in inequality occur mostly at the tails of the distribution rather than around the mode.

The cross-correlation analysis shows that inequality in hours of work, earnings, market and net income are generally counter-cyclical (with the exception of Germany). There is some evidence that inequality in hourly wages is pro-cyclical in Germany and the UK. In Anglo-Saxon countries, consumption inequality is pro-cyclical. A candidate explanation of this finding is that households at the bottom of the income distribution may keep constant their level of consumption through debt, such that their reduced income during recessions does not translate into higher consumption inequality. For Germany we find that most inequality variables are pro-cyclical: these results are likely determined by the process of reunification of the country. For inflation, we find a negative correlation with most sources of inequality across countries. The cross-correlation analysis for unemployment confirm the

stylized facts found in the literature: increases in unemployment are associated with increases in income inequality. However, we find a negative correlation between consumption inequality and unemployment. These results strengthen the hypothesis that during recessions people at the bottom of the income distribution compensate their losses in income increasing their debt. The correlations between share prices and inequality are negative in most of the cases. However, the correlations between share prices and inequality in hours of work, earnings, market income, and consumption inequality are positive and strong. An expansion of government consumption is associated with a reduction in disposable income inequality in Canada and the US and with an increase in European countries (Germany, Netherlands, Sweden). These results can be due to different taxation systems and/or a different composition of government consumption between the European and Anglo-Saxon countries considered in this study. A European versus Anglo-Saxon country pattern emerges also for private consumption. Indeed, private consumption is negatively correlated with disposable income inequality in Canada and the US and positively in the Netherlands and Sweden. Furthermore, private consumption is positively correlated with higher levels of consumption inequality.

Finally, the results of the Granger tests suggest that disposable income inequality causes output in Canada, Netherlands and Sweden. The same holds for earnings inequality in the US. As a consequence, increases in inequality may lead to recessions. Other sources and measures of inequality show instead a mutual relationship with GDP. Similarly, we find mutual relationships between inflation and inequality, though in most cases it seems that inequality Granger causes inflation. As expected, unemployment causes inequality. However, in some cases inequality is shown to generate further unemployment. We find a mutual relationship between share prices and inequality. Nonetheless, in Canada, Netherlands and Sweden we find a one-way causation from inequality to share prices. For the US, we find that share prices Granger cause consumption inequality and the earnings gap between the 90th and 50th percentile. Government consumption considerably affects disposable income inequality in the Netherlands and earnings inequality in Canada.

Our analysis shows that the relationships between economic inequality and macroeconomic factors may be country-specific and depend on institutional characteristics. In particular, the impact of business cycle on disposable income inequality depends on the country-specific tax and transfer system. Moreover, other institutional settings such as those that regulate labour and consumer credit markets may affect the impact of business cycles on e.g. hours of work, wage and consumption inequality. Finally, the long-term rise in economic inequality observed in the last decades cannot be explained by the cyclical effects of output. The long-run relationship between output and inequality and the possible asymmetric effects of booms and busts on inequality should be further investigated.



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Appendix – Inequality indexes

Gini coefficient: measures the ratio of the area that lies between the line of perfect equality and the Lorenz curve of the actual distribution of income. The line of perfect equality corresponds to each percentile of the income distribution receiving an equal share of total income. It corresponds to the 45 degrees line. The Lorenz curve plots the proportion of total income of the population (on the y axis) that is cumulatively earned by the bottom x% of the population. If the Lorenz curve is approximated on each interval as a line between consecutive points, the Gini coefficient can be calculated as follows:

$$G = 1/2 - \sum_{k=1} (X_k - X_{k-1})(Y_k - Y_{k-1}) \quad (1)$$

where X is the cumulated proportion of the population variable, Y is the cumulated proportion of the income variable and individuals are ranked in ascending order of Y. The Gini coefficient ranges between 0 and 1.

Percentile ratios (Pratios): correspond to the upper bound or mean income of percentile $p + n$ over the upper bound or mean income of percentile p :

$$P_{p+n}P_p = \mu_{p+n}/\mu_p \quad (2)$$

or

$$P_{p+n}P_p = \max(Y_{1,p+n}, \dots, Y_{N,p+n})/\max(Y_{1,p}, \dots, Y_{N,p}) \quad (3)$$

where μ is mean income of percentile p and Y is income of individual i in percentile p . The minimum value of P-ratios is 1 and they have an unbounded maximum.

Variance of logarithms: is the variance applied to log incomes.

The variance of logarithms may assume values between 0 and infinity.



Table 1: Selected indicators from the RED database.

Country	Inequality	Source	Start	End	Gini	Var log	P9050	P5010	Unit	Sample	Type
CAN	wage	SCF	1977	1997	x	x	x	x	individual	universe	hourly
CAN	wage	SLID	1996	2005	x	x	x	x	individual	universe	hourly
CAN	hours	SCF	1977	1997	x	x			individual	male	
CAN	hours	SLID	1996	2005	x	x			individual	male	
CAN	earnings	SCF	1977	1997	x	x	x	x	household	universe	gross
CAN	earnings	SLID	1996	2005	x	x	x	x	household	universe	gross
CAN	income	SCF	1977	1997	x	x			household	universe	gross
CAN	income	SLID	1996	2005	x	x			household	universe	gross
CAN	income	SCF	1977	1997	x	x	x	x	household	universe	dispos.
CAN	income	SLID	1996	2005	x	x			household	universe	dispos.
GER	wage	GSOEP	1983	2004		x			individual	male	hourly
GER	hours	GSOEP	1983	2004	x	x	x	x	individual	male	
GER	earnings	GSOEP	1983	2004	x	x	x	x	household	universe	gross
GER	income	GSOEP	1984	2004	x	x	x	x	household	universe	dispos.
GER	income	GSOEP	1983	2004	x	x			household	universe	gross
GBR	wage	FES	1978	2005	x	x	x	x	individual	male	hourly
GBR	hours	FES	1978	2005		x			individual	male	
GBR	earnings	FES	1978	2005	x	x	x	x	household	universe	gross
GBR	consumpt.	FES	1978	2005	x	x			household	universe	
SWE	wage	HINK	1975	1992		x			individual	male	hourly
SWE	hours	HINK	1975	1992		x			individual	male	
SWE	earnings	LINDA	1978	2004	x	x	x	x	household	universe	gross
SWE	income	LINDA	1978	2004		x			household	universe	dispos.
USA	wage	CPS	1967	2005	x	x	x	x	individual	male	hourly
USA	hours	CPS	1967	2005		x			individual	male	
USA	earnings	CPS	1967	2005	x	x	x	x	household	universe	gross
USA	income	CPS	1967	2005	x	x			household	universe	gross
USA	income	CPS	1979	2004	x	x			household	universe	dispos.
USA	consumpt.	CES	1980	2006	x	x	x	x	household	universe	non-dur.
NLD*	income	CBS	1989	2008	x	Theil	polarization		household	universe	dispos.



Table 2: Dickey-Fuller (DF) Stationarity tests.

Country	Type	Index	DF(0)	DDF(0)	TSDF(0)	DF(1)	DDF(1)	TSDF(1)
CAN	earnings	gini	0	0	0	0	0	0
CAN	earnings	p5010	0	0	0	0	0	0
CAN	earnings	p9050	0	0	0	0	0	0
CAN	earnings	varlog	0	0	0	0	0	0
CAN	hours work	varlog	0	0	0	0	0	0
CAN	hourly wage	varlog	0	0	0	0	0	0
CAN	gross y	varlog	0	0	0	0	0	0
CAN	diposable y	varlog	0	0	0	0	0	0
GER	earnings	gini	0	0	0	0	0	1
GER	earnings	p5010	0	0	0	0	0	0
GER	earnings	p9050	0	0	1	0	0	1
GER	earnings	varlog	0	0	0	0	0	0
GER	hours work	gini	0	0	0	0	0	0
GER	hours work	p5010	0	0	0	0	0	0
GER	hours work	p9050	0	1	0	0	0	0
GER	hours work	varlog	0	0	0	0	0	0
GER	hourly wage	varlog	0	0	0	0	0	0
GER	gross y	gini	0	0	0	0	0	1
GER	diposable y	gini	0	0	0	0	0	0
GER	diposable y	p5010	0	0	0	0	0	0
GER	diposable y	p9050	0	0	1	0	0	1
GER	diposable y	varlog	0	0	0	0	0	0
GBR	consumption	varlog	0	0	1	0	0	0
GBR	earnings	gini	0	1	0	0	1	0
GBR	earnings	p5010	0	0	0	0	0	0
GBR	earnings	p9050	0	0	0	0	0	0
GBR	earnings	varlog	0	0	0	0	0	0
GBR	hours work	varlog	0	0	0	0	0	0
GBR	hourly wage	gini	0	0	0	0	0	0
GBR	hourly wage	p5010	0	0	0	0	0	0
GBR	hourly wage	p9050	0	0	0	0	0	0
GBR	hourly wage	varlog	0	0	0	0	0	0
NLD	diposable y	Theil	0	0	0	0	0	0
NLD	diposable y	Gini	0	0	0	0	0	0
NLD	diposable y	Pola	0	0	1	0	0	0
SWE	earnings	gini	0	0	0	0	0	0
SWE	earnings	p9050	0	0	0	0	0	0
SWE	earnings	varlog	0	0	0	0	0	0
SWE	diposable y	varlog	0	0	0	0	0	0
USA	consumption	gini	0	0	0	0	0	0
USA	consumption	p5010	0	0	0	0	0	0
USA	consumption	p9050	0	0	1	0	0	0
USA	consumption	varlog	0	0	0	0	0	0
USA	earnings	gini	0	0	0	0	0	0
USA	earnings	p5010	0	0	0	0	1	0
USA	earnings	p9050	0	0	1	0	0	0
USA	earnings	varlog	0	0	0	0	1	0
USA	hours work	varlog	0	0	0	0	0	0
USA	hourly wage	gini	0	0	0	0	0	0
USA	hourly wage	p5010	0	0	0	0	0	0
USA	hourly wage	p9050	0	0	0	0	0	0
USA	hourly wage	varlog	0	0	0	0	0	0
USA	gross y	gini	0	0	1	0	0	0
USA	gross y	varlog	0	0	0	0	0	0
USA	diposable y	gini	0	0	0	0	0	0
USA	diposable y	varlog	0	0	0	0	1	0

DDF: inclusion of drift; TSDF: inclusion of drift and linear trend. Number of lags in parentheses. “0” acceptance of the unit-root null hypothesis; “1” rejection of the unit-root null hypothesis.

Table 3: Engle-Granger cointegration tests: *p*-values

Country	inequality	Index	CPI	GDP	Priv. cons.	Gov. cons.	Share pr.	Unempl.
CAN	earnings	gini	0.4338	0.3865	0.4439	0.6722	0.0320	0.6194
CAN	earnings	p5010	0.5011	0.9694	0.9748	0.9477	0.8040	0.7088
CAN	earnings	p9050	0.3372	0.4913	0.4818	0.4582	0.1438	0.6835
CAN	earnings	varlog	0.3533	0.9079	0.9151	0.8097	0.6017	0.8006
CAN	hours work	varlog	0.4709	0.6406	0.6456	0.5349	0.4169	0.8104
CAN	hourly wage	varlog	0.2472	0.6591	0.6839	0.6064	0.2926	0.7356
CAN	gross y	varlog	0.3996	0.9366	0.9468	0.9089	0.6754	0.7844
CAN	disposable y	varlog	0.6099	0.5093	0.5663	0.5375	0.2481	0.6663
GER	earnings	gini	0.5848	0.1697		0.0627	0.3741	0.5757
GER	earnings	p5010	0.5839	0.6173		0.5822	0.2902	0.6951
GER	earnings	p9050	0.5132	0.6907		0.9407	0.5351	0.9135
GER	earnings	varlog	0.4155	0.8063		0.8809	0.3167	0.8890
GER	hours work	gini	0.5866	0.5244		0.3814	0.3504	0.4204
GER	hours work	p5010	0.5772	0.2344		0.3508	0.3943	0.6486
GER	hours work	p9050	0.5765	0.9421		0.9031	0.7225	0.6012
GER	hours work	varlog	0.5672	0.1098		0.1357	0.3705	0.6022
GER	hourly wage	varlog	0.5841	0.7173		0.8384	0.5762	0.5730
GER	gross y	gini	0.5762	0.3174		0.2837	0.4785	0.5632
GER	disposable y	gini	0.6578	0.1378		0.4497	0.3788	0.8373
GER	disposable y	p5010	0.6362	0.1891		0.5062	0.4184	0.8567
GER	disposable y	p9050	0.6487	0.1024		0.3360	0.3731	0.7783
GER	disposable y	varlog	0.6507	0.5805		0.6288	0.5506	0.6423
GBR	consumption	varlog	0.0956	0.6891	0.6931	0.9861	0.0799	0.4951
GBR	earnings	gini	0.0657	0.9247	0.9194	0.9967	0.0191	0.6012
GBR	earnings	p5010	0.0628	0.4632	0.4604	0.9481	0.0758	0.5123
GBR	earnings	p9050	0.2915	0.9990	0.9990	0.9990	0.9872	0.8889
GBR	earnings	varlog	0.0153	0.9497	0.9306	0.9928	0.3512	0.8674
GBR	hours work	varlog	0.0423	0.9813	0.9817	0.9990	0.6627	0.7921
GBR	hourly wage	gini	0.3067	0.9923	0.9911	0.9990	0.8608	0.8643
GBR	hourly wage	p5010	0.1352	0.8427	0.8289	0.9830	0.4028	0.7183
GBR	hourly wage	p9050	0.2334	0.9858	0.9822	0.9990	0.7698	0.7835
GBR	hourly wage	varlog	0.1711	0.0096	0.0064	0.5022	0.4982	0.2892
NLD	disposable y	theil	0.2573	0.5960	0.7315	0.2029	0.8396	0.7212
NLD	disposable y	gini	0.1895	0.4899	0.6433	0.0968	0.8340	0.6978
NLD	disposable y	pola	0.1946	0.0147	0.0031	0.1534	0.1882	0.5266
SWE	earnings	gini	0.0863	0.9273	0.9571	0.2593	0.5286	0.6817
SWE	earnings	p9050	0.0739	0.9696	0.9781	0.5422	0.6575	0.5980
SWE	earnings	varlog	0.0899	0.8816	0.9342	0.1482	0.4681	0.7302
SWE	disposable y	varlog	0.3028	0.3128	0.4565	0.0222	0.2749	0.6607
USA	consumption	gini	0.1749	0.0829	0.0899	0.0187	0.0903	0.3960
USA	consumption	p5010	0.1925	0.2088	0.2077	0.0139	0.5152	0.4298
USA	consumption	p9050	0.1593	0.2543	0.2945	0.1034	0.0339	0.3789
USA	consumption	varlog	0.3787	0.9118	0.9099	0.8755	0.9489	0.4428
USA	earnings	gini	0.5102	0.9797	0.9782	0.9779	0.9852	0.0767
USA	earnings	p5010	0.2434	0.2096	0.2320	0.4811	0.5292	0.4684
USA	earnings	p9050	0.4281	0.9617	0.9660	0.9749	0.9625	0.4877
USA	earnings	varlog	0.1692	0.0113	0.0129	0.0031	0.0318	0.4134
USA	hours work	varlog	0.4469	0.9784	0.9809	0.9859	0.9736	0.4898
USA	hourly wage	gini	0.1705	0.0466	0.0645	0.0995	0.0434	0.4130
USA	hourly wage	p5010	0.3365	0.9003	0.9111	0.9230	0.9017	0.5077
USA	hourly wage	p9050	0.2949	0.2569	0.2891	0.1366	0.1570	0.4736
USA	hourly wage	varlog	0.2344	0.9479	0.9567	0.8995	0.8853	0.6889
USA	gross y	gini	0.3463	0.1311	0.1393	0.0788	0.1694	0.3017
USA	gross y	varlog	0.4062	0.1782	0.1687	0.2103	0.2516	0.4229
USA	disposable y	gini	0.1196	0.2800	0.3151	0.1391	0.1825	0.2129
USA	disposable y	varlog	0.3198	0.1940	0.1856	0.3618	0.2981	0.4787



Table 4: Standard deviations of hp-filtered inequality series

Type	Index	CAN	GER	GBR	NLD	SWE	USA
consumption	gini						0,004
consumption	p5010						0,025
consumption	p9050						0,029
consumption	varlog			0,012			0,007
earnings	gini	0,007	0,007	0,006		0,008	0,004
earnings	p5010	0,118	0,131	0,064			0,063
earnings	p9050	0,038	0,029	0,023		0,032	0,024
earnings	varlog	0,036	0,035	0,021		0,078	0,024
hours work	varlog			0,009			
hours work	gini		0,005				
hours work	p5010		0,080				
hours work	p9050		0,034				
hours work	varlog	0,023	0,018				0,009
hourly wage	gini			0,004			0,004
hourly wage	p5010			0,018			0,025
hourly wage	p9050			0,030			0,026
hourly wage	varlog	0,014	0,018	0,008			0,008
gross y	gini		0,007				0,004
gross y	varlog	0,041					0,023
diposable y	gini		0,008		0,004		0,006
diposable y	p5010		0,041				
diposable y	p9050		0,027				
diposable y	varlog	0,009	0,021			0,034	0,015
diposable y	theil				0,006		
diposable y	pola				0,003		

Table 5: Cross-correlations CPI inequality, CAN

inequality	index	t3	t_2	t_1	t	t1	t2	t3
earnings	gini	0.228	0.346	.5651***	0.300	-0.278	-.71775***	-.68398***
earnings	p5010	0.0543	0.237	.51004**	0.142	-.37793*	-.52436**	-.42323*
earnings	p9050	0.320	.3811*	.39099*	0.0761	-.44907**	-.7321***	-.60038***
earnings	varlog	0.311	.43303**	.48712**	-0.00756	-.45075**	-.72333***	-.47695**
hours work	varlog	0.229	.4049*	.68886***	0.263	-0.249	-.72579***	-.61524***
hourly wage	varlog	.41226*	0.308	.37157*	0.171	-0.156	-.53013**	-.5311**
gross y	varlog	0.361	.50457**	.46239**	-0.0801	-.42527*	-.67106***	-.53141**
disposable y	varlog	.39451*	0.357	.41453*	-0.0304	-.39734*	-.67541***	-.57818***

Table 6: Cross-correlations GDP inequality, CAN

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	0.288	0.117	-0.168	-0.68317***	-.81348***	-.45657**	0.0498
earnings	p5010	0.184	0.0664	-0.257	-.69868***	-.65171***	-0.236	0.204
earnings	p9050	0.251	0.00879	-0.333	-.82755***	-.80678***	-.42449*	0.0223
earnings	varlog	0.295	-0.0375	-.43493**	-.83464***	-.76152***	-.39517*	0.0403
hours work	varlog	.39564*	0.257	-0.129	-.6917***	-.77839***	-.46978**	-0.173
hourly wage	varlog	0.135	0.00487	-0.0349	-0.302	-.38711*	-0.212	0.230
gross y	varlog	0.186	-0.0739	-.51935**	-.83351***	-.70209***	-0.316	0.0328
disposable y	varlog	0.114	-0.0801	-0.329	-.71806***	-.68373***	-0.279	0.197

Table 7: Cross-correlations private consumption inequality, CAN

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	.4303*	0.215	-0.136	-.66516***	-.81152***	-.65437***	-0.245
earnings	p5010	0.268	0.0735	-0.238	-.58878***	-.59033***	-.45154**	-0.108
earnings	p9050	.39392*	0.0973	-0.286	-.7754***	-.78728***	-.55502***	-0.187
earnings	varlog	.44242**	0.0735	-.38985*	-.7616***	-.73932***	-.58756***	-0.220
hours work	varlog	.56774***	.37132*	-0.0869	-.63031***	-.74998***	-.65273***	-.42118*
hourly wage	varlog	0.145	-0.0134	-0.122	-.41023*	-.45625**	-.37033*	0.0264
gross y	varlog	0.358	0.0524	-.46033**	-.79968***	-.78466***	-.55888***	-0.215
disposable y	varlog	0.214	-0.0386	-0.347	-.72057***	-.73018***	-.46759**	-0.00887

Table 8: Cross-correlations government consumption inequality, CAN

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	0.244	0.267	0.295	0.120	-0.0959	-0.363	-.4876**
earnings	p5010	0.349	0.276	0.168	-0.107	-0.306	-.42028*	-.45537**
earnings	p9050	.54617**	.61383***	.55383***	0.293	-0.139	-.47999**	-.65967***
earnings	varlog	.54379**	.53306**	.46967**	0.108	-0.223	-.50567**	-.67151***
hours work	varlog	0.304	.39229*	.43974**	0.337	-0.0144	-0.238	-.39072*
hourly wage	varlog	-0.189	-0.229	-0.180	-0.120	-0.0511	-0.0885	-0.105
gross y	varlog	.47462**	.42122*	0.351	0.0924	-0.278	-.52263**	-.66089***
disposable y	varlog	0.328	0.310	0.246	0.0488	-0.211	-.45826**	-.53908**

Table 9: Cross-correlations unemployment inequality, CAN

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	-.45845**	-0.329	-0.0113	.52995**	.82968***	.635***	0.158
earnings	p5010	-0.255	-0.228	0.0683	.51978**	.61752***	0.349	-0.0703
earnings	p9050	-.38701*	-0.103	0.248	.72532***	.85179***	.49367**	0.0183
earnings	varlog	-.42276*	-0.155	0.275	.72534***	.78263***	.47269**	0.0282
hours work	varlog	-.53218**	-.44232**	-0.0472	.54242**	.82613***	.63493***	0.309
hourly wage	varlog	-.37191*	-0.207	-0.0523	0.313	.52629**	.43497**	0.0947
gross y	varlog	-.42506*	-0.150	0.349	.73288***	.76767***	.45175**	0.0309
disposable y	varlog	-0.339	-0.0873	0.264	.65985***	.75221***	.43833**	-0.0710

Table 10: Cross-correlations share prices inequality, CAN

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	0.0102	-0.00480	-0.155	-.49582**	-0.318	0.0298	0.193
earnings	p5010	-0.0702	-0.103	-0.250	-0.342	-0.226	0.147	.4311*
earnings	p9050	-0.103	-0.189	-0.332	-.73966***	-.40211*	0.0304	0.285
earnings	varlog	0.0309	-0.245	-.40192*	-.6724***	-0.223	-0.0243	.37491*
hours work	varlog	0.109	0.166	-0.293	-.57412***	-0.333	-0.0909	-0.0963
hourly wage	varlog	0.162	0.132	0.0756	-0.195	0.0374	0.121	0.114
gross y	varlog	-0.0503	-0.127	-.40722*	-.56904***	-0.275	0.171	0.276
disposable y	varlog	-0.0116	-0.141	-0.219	-.53087**	-0.294	0.194	.40858*

Table 11: Cross-correlations CPI inequality, GER

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	-0.261	-0.177	0.140	.64511***	.59287**	0.279	0.190
earnings	p5010	.68204***	.81***	.63843***	0.268	0.0172	-0.332	-.66785***
earnings	p9050	-0.314	0.0315	0.280	.48037*	0.228	0.105	0.199
earnings	varlog	0.252	.48938*	.53765**	.5055**	0.373	0.137	-0.306
hours work	gini	.6633***	.46238*	0.113	-0.212	-.47063*	-.71542***	-.58246**
hours work	p5010	.61338**	.5007**	0.168	-0.218	-.55764**	-.59724**	-.50311**
hours work	p9050	-0.106	-0.201	-0.238	-0.178	0.0353	-0.0404	-0.0188
hours work	varlog	.64081***	.49686*	0.0247	-0.196	-.50836**	-.65405***	-.53926**
hourly wage	varlog	0.261	.52224**	.52508**	0.378	0.190	-0.174	-.52782**
gross y	gini	0.0289	0.215	0.411	.58551**	0.399	0.135	-0.0980
disposable y	gini	-0.121	0.189	.49531*	.45824*	0.417	0.279	0.295
disposable y	p5010	0.374	.56355**	.6634***	0.418	0.0739	-0.234	-0.322
disposable y	p9050	0.0112	0.300	0.0378	-0.0788	0.0431	0.229	-0.00909
disposable y	varlog	0.0606	0.293	.51731**	.47276*	0.184	-0.0914	0.105

Table 12: Cross-correlations GDP inequality, GER

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	-0.0751	-0.0429	0.165	0.334	0.372	0.341	0.253
earnings	p5010	.53925**	.67264***	.56454**	0.171	-0.253	-0.405	-0.290
earnings	p9050	-0.0393	0.135	0.248	0.265	0.157	-0.0249	0.0546
earnings	varlog	0.119	0.249	.44552*	0.418	0.162	-0.0649	-0.0787
hours work	gini	.70295***	.54168**	-0.0200	-0.266	-0.391	-.44716*	-0.190
hours work	p5010	.7086***	.4367*	-0.0386	-0.295	-0.390	-0.353	-0.0994
hours work	p9050	-0.0871	0.0133	-0.0988	-0.0203	0.0963	0.0276	-0.164
hours work	varlog	.68376***	.45053*	0.0931	-0.180	-.52814**	-.56587**	-0.230
hourly wage	varlog	0.153	0.419	.77194***	.60643**	-0.0366	-.55699**	-.5663**
gross y	gini	0.199	0.104	0.294	0.377	0.336	0.237	0.00606
disposable y	gini	0.0728	0.186	0.101	0.320	0.377	0.158	-0.103
disposable y	p5010	0.378	.59656**	0.407	0.133	-0.0150	-0.246	-0.357
disposable y	p9050	0.0370	0.125	0.150	-0.0337	-0.0348	-0.284	-0.201
disposable y	varlog	0.272	0.335	0.110	0.241	0.177	0.0504	-0.0614

Table 13: Cross-correlations government consumption inequality, GER

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	-0.303	-0.372	-0.171	-0.276	-0.322	-0.0534	.57366**
earnings	p5010	-.53545**	-0.386	0.0622	.45262*	.47764*	0.325	0.270
earnings	p9050	-0.309	-0.199	-0.265	-0.269	0.0978	0.0647	0.114
earnings	varlog	-0.420	-.55849**	-.44014*	-0.0307	0.335	.42704*	.44779*
hours work	gini	0.00693	.50216**	.58142**	.61395**	0.416	0.202	0.0568
hours work	p5010	0.0669	0.424	.46745*	.46717*	.47253*	0.252	0.0858
hours work	p9050	0.0894	0.228	0.242	0.253	-0.128	-0.177	-0.179
hours work	varlog	-0.0107	0.341	.56567**	.60682**	.43566*	0.00136	-0.0689
hourly wage	varlog	-0.325	-.53696**	-0.0646	0.413	.68203***	0.301	0.0173
gross y	gini	-0.276	-0.337	-0.0694	-0.126	0.0213	0.300	.77223***
disposable y	gini	-0.372	-0.202	-.4609*	-0.374	-0.214	0.257	0.242
disposable y	p5010	-.5012*	-0.119	-0.0385	0.0330	0.236	.5026*	0.311
disposable y	p9050	-0.0651	-0.169	-0.205	-0.112	0.166	-0.229	-.45551*
disposable y	varlog	-0.407	-0.0300	-0.180	-0.166	-0.0630	0.389	.47836*

Table 14: Cross-correlations unemployment inequality, GER

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	-0.146	-0.362	-.43779*	-0.338	-0.183	-0.0197	0.219
earnings	p5010	-.75825***	-.55643**	-0.227	0.170	.63608***	.72675***	.47768*
earnings	p9050	-0.277	-.4815*	-0.360	-0.150	-0.00547	0.0810	0.215
earnings	varlog	-.55725**	-.52109**	-0.388	-0.0609	0.338	.57242**	0.419
hours work	gini	-0.288	-0.0332	0.420	.64832***	.59617**	0.406	0.165
hours work	p5010	-0.387	-0.0566	.51606**	.70449***	.60416**	0.386	0.0957
hours work	p9050	0.374	0.320	0.0517	-0.165	-0.362	-0.295	-0.0344
hours work	varlog	-0.268	-0.0277	0.285	0.425	.55712**	.4322*	0.173
hourly wage	varlog	-0.262	-0.410	-.45198*	-0.376	0.228	.62217**	.53**
gross y	gini	-0.402	-0.335	-0.240	-0.204	0.0546	0.266	.46796*
disposable y	gini	-.49048*	-.50296*	-0.402	-0.296	-0.253	0.179	.506*
disposable y	p5010	-.64951***	-.63371**	-0.338	0.177	0.436	.59364**	.57478**
disposable y	p9050	-0.228	-0.147	-0.298	-0.198	-0.0104	0.175	0.200
disposable y	varlog	-.54635**	-.4973*	-0.211	0.0245	0.0609	0.269	.47884*

Table 15: Cross-correlations share prices inequality, GER

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	.67108***	.44246*	-0.240	-.55514**	-0.293	-0.302	-0.351
earnings	p5010	-0.370	-0.398	-.56395**	-.66935***	-.51931**	-0.0674	0.210
earnings	p9050	0.329	-0.0559	-0.0311	-0.236	-.44241*	-0.340	0.0268
earnings	varlog	-0.190	-.51762**	-.59185**	-.70661***	-.57169**	-0.110	0.288
hours work	gini	-0.410	-0.333	-0.339	-0.139	0.0153	0.383	.52778**
hours work	p5010	-.53402**	-.62516***	-.43973*	-0.130	-0.0270	.47162*	.70567***
hours work	p9050	0.132	.63799***	.54332**	0.404	0.368	-0.0443	-.51883**
hours work	varlog	-0.337	-0.163	-0.156	0.0115	-0.0906	0.189	0.352
hourly wage	varlog	-0.216	0.0222	0.166	-0.0942	-0.376	-0.360	-0.192
gross y	gini	0.342	-0.00539	-.54174**	-.59757**	-0.290	-0.145	-0.140
disposable y	gini	.46396*	-0.0420	-0.271	-.47695*	-.51858**	-.62412**	-0.256
disposable y	p5010	0.105	-.50925*	-.59523**	-.66393***	-.5545**	-0.368	0.243
disposable y	p9050	-0.0526	0.0292	0.362	-0.178	-.46208*	-0.407	-0.0187
disposable y	varlog	0.344	-0.262	-.57992**	-.48237*	-0.351	-0.375	0.0202

Table 16: Cross-correlations CPI inequality, GBR

consumption	varlog	-0.183	-0.246	-0.232	0.0128	0.160	0.291	.37939*
earnings	gini	.39648*	0.304	-0.0677	-.54268***	-.69969***	-.48291**	-0.202
earnings	p5010	-0.162	0.0263	0.126	0.0270	-0.153	-0.338	-0.203
earnings	p9050	0.211	.39662*	0.279	0.0844	0.118	0.0968	0.0775
earnings	varlog	-0.0966	0.0484	0.232	0.0486	-0.0748	-.37211*	-0.262
hours work	varlog	.38472*	-0.212	-.58656***	-.51478**	-.37081*	-0.0145	0.0660
hourly wage	gini	-0.282	-0.190	-0.0552	-0.0286	0.0373	0.132	.36944*
hourly wage	p5010	0.161	0.249	-0.0392	-0.0825	0.0245	0.267	0.0583
hourly wage	p9050	-.38614*	-0.354	-0.177	-0.0692	0.0267	-0.0212	0.206
hourly wage	varlog	-0.143	-0.0713	-0.0479	0.0180	0.0484	0.0675	0.206

Table 17: Cross-correlations GDP inequality, GBR

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	varlog	0.0210	0.199	.43704**	.5177**	.43455**	0.318	0.149
earnings	gini	-0.225	-.6108***	-.77608***	-.52689**	-0.116	0.314	.54171***
earnings	p5010	-0.173	-0.184	-0.264	-0.241	-0.0502	0.199	0.317
earnings	p9050	.49391**	0.261	0.0581	0.00205	-0.0688	-0.215	-.41362*
earnings	varlog	-0.0936	-0.125	-0.254	-0.262	-0.126	0.105	0.186
hours work	varlog	-.64984***	-.74584***	-.45085**	-0.0192	0.222	0.332	.45748**
hourly wage	gini	0.0446	0.228	.36073*	.44359**	.43646**	.37512*	0.118
hourly wage	p5010	0.0883	-0.00584	0.00499	0.119	0.0473	-0.182	-0.279
hourly wage	p9050	-0.208	0.0802	0.294	.41979*	.44705**	.47925**	.39396*
hourly wage	varlog	0.103	0.243	0.334	.36786*	0.281	0.172	0.0325

Table 18: Cross-correlations private consumption inequality, GBR

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	varlog	-0.127	0.0512	0.303	.45405**	.51815**	.50139**	0.302
earnings	gini	-0.163	-.56487***	-.79637***	-.63909***	-0.281	0.0628	.36562*
earnings	p5010	-0.196	-0.296	-.37146*	-.36235*	-0.140	0.123	0.258
earnings	p9050	.38006*	0.329	0.242	0.204	0.0388	-0.159	-0.357
earnings	varlog	-0.165	-0.205	-0.296	-0.320	-0.202	0.0491	0.123
hours work	varlog	-.56374***	-.68308***	-.52374**	-0.282	-0.000425	0.162	.36942*
hourly wage	gini	-0.237	0.0534	0.260	.44702**	.56003***	.52706**	0.273
hourly wage	p5010	0.00384	0.0297	0.108	0.160	0.0752	-0.210	-0.242
hourly wage	p9050	-.43158**	-0.155	0.122	0.308	.45734**	.64006***	.53988***
hourly wage	varlog	-0.119	0.122	0.292	.36898*	.40312*	0.339	0.168

Table 19: Cross-correlations government consumption inequality, GBR

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	varlog	-0.327	-0.347	-0.303	-0.200	-0.0758	0.154	.43409**
earnings	gini	0.306	0.281	0.112	-0.136	-0.281	-.47018**	-.45821**
earnings	p5010	0.353	0.0499	-0.189	-.41056*	-.5057**	-.5403***	-.48719**
earnings	p9050	0.141	0.0929	0.0115	0.107	0.318	0.244	0.175
earnings	varlog	.37249*	0.120	-0.156	-.38499*	-.38434*	-.40458*	-.40039*
hours work	varlog	0.252	0.0430	-0.0773	-0.173	-0.260	-.36593*	-0.356
hourly wage	gini	-.53938***	-.51162**	-0.357	-0.252	0.0346	0.263	.53659**
hourly wage	p5010	-0.198	-0.0404	0.0323	-0.196	-0.00672	0.201	0.226
hourly wage	p9050	-.39641*	-.47029**	-.36993*	-0.314	-0.177	0.0579	0.338
hourly wage	varlog	-.60516***	-.66942***	-0.328	-0.111	0.116	0.283	.51619**

Table 20: Cross-correlations unemployment inequality, GBR

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	varlog	0.211	-0.0166	-0.241	-.41713*	-.41336*	-0.341	-0.202
earnings	gini	-0.117	0.261	.60374***	.68011***	.45777**	-0.00148	-.37462*
earnings	p5010	0.175	0.0833	0.0765	0.123	0.0820	-0.111	-0.330
earnings	p9050	-.41276*	-0.344	-0.221	-0.0434	0.0332	0.0729	0.242
earnings	varlog	0.0777	0.0336	0.0334	0.132	0.125	-0.0302	-0.192
hours work	varlog	0.299	.62504***	.66146***	0.311	0.00164	-0.202	-.37944*
hourly wage	gini	0.0553	-0.115	-0.255	-0.312	-0.319	-0.347	-0.214
hourly wage	p5010	-0.180	-0.0269	0.0239	-0.133	-0.137	0.00886	0.199
hourly wage	p9050	0.352	0.0924	-0.132	-0.262	-0.305	-0.348	-.36781*
hourly wage	varlog	-0.0519	-0.224	-0.291	-0.289	-0.208	-0.164	-0.0568

Table 21: Cross-correlations share prices inequality, GBR

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	varlog	0.0429	0.250	.49183**	.45899**	.3668*	0.0227	-0.262
earnings	gini	-.63167***	-.57851***	-0.133	0.297	.47916**	.38195*	0.209
earnings	p5010	-.62642***	-.54076***	-0.172	.38353*	.66907***	.6443***	0.285
earnings	p9050	0.131	-0.115	0.0112	0.0158	-0.215	-.35996*	-0.341
earnings	varlog	-.52353**	-.53989***	-0.155	0.263	.47393**	.50871**	0.281
hours work	varlog	-.50945**	-0.122	0.161	0.210	0.268	0.301	0.179
hourly wage	gini	0.314	.54158***	.81124***	.6436***	0.193	-0.324	-.65819***
hourly wage	p5010	0.353	0.226	0.0887	-0.0191	-0.269	-0.330	-0.209
hourly wage	p9050	0.0918	0.291	.64509***	.69173***	.42157*	0.0389	-0.289
hourly wage	varlog	0.318	.46807**	.7515***	.62537***	0.139	-0.343	-.6753***

Table 22: Cross-correlations CPI inequality, NLD

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
disposable y	Theil	-0.138	0.145	.52912*	.7386***	0.186	-0.447	-.51918*
disposable y	gini	0.0907	0.455	.46946*	.54577**	0.0867	-.54844**	-.69907***
disposable y	pola	0.255	0.106	-0.194	-0.215	0.0112	0.000174	-0.299

Table 23: Cross-correlations GDP inequality, NLD

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
disposable y	Theil	.55451**	.72463***	.54098**	0.0133	-.49247*	-.69355***	-.63718**
disposable y	gini	.55144**	.53302**	0.209	-0.278	-.68905***	-.83087***	-.56996**
disposable y	pola	-0.312	-.46739*	-.46397*	-0.308	-0.175	-0.119	0.0905

Table 24: Cross-correlations private consumption inequality, NLD

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
disposable y	Theil	.58276**	.76612***	.62722**	0.276	-0.190	-0.453	-.5172*
disposable y	gini	.61122**	.60314**	0.291	-0.100	-.50392*	-.70209***	-.59317**
disposable y	pola	-0.191	-.47772*	-.59493**	-.5697**	-.49913*	-0.307	0.0262

Table 25: Cross-correlations government consumption inequality, NLD

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
disposable y	Theil	-0.293	-0.128	0.156	0.218	0.412	0.123	-.48616*
disposable y	gini	-0.173	0.170	.54437**	0.333	0.243	0.0751	-0.423
disposable y	pola	0.215	0.439	0.436	0.0890	0.0536	0.0325	-0.117

Table 26: Cross-correlations unemployment inequality, NLD

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
disposable y	Theil	-.53229*	-.64175**	-.54681**	-0.324	0.0955	.55214**	.75976***
disposable y	gini	-.6749***	-.67213***	-0.346	0.00478	0.447	.73408***	.74931***
disposable y	pola	-0.0867	0.144	0.446	.50679*	0.362	0.118	-0.0429

Table 27: Cross-correlations share prices inequality, NLD

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
disposable y	Theil	.65233**	0.438	0.109	-0.300	-.66736***	-.76233***	-.49756*
disposable y	gini	.47836*	0.216	-0.191	-.54414**	-.73679***	-.71884***	-0.264
disposable y	pola	-.45802*	-0.355	-0.346	-0.183	0.0251	0.128	0.274

Table 28: Cross-correlations CPI inequality, SWE

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	.53051**	0.180	-0.0405	-0.348	-.56657***	-.49125**	-0.269
earnings	p9050	.4752**	0.204	0.0125	-0.214	-.55243***	-.53216**	-0.352
earnings	varlog	.44338**	0.115	-0.139	-.44566**	-.61015***	-.48163**	-0.214
disposable y	varlog	0.108	0.277	.75165***	0.267	-0.112	-0.0655	-0.118

Table 29: Cross-correlations GDP inequality, SWE

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	-0.205	-.54024**	-.83405***	-.85047***	-.56972***	-0.196	0.143
earnings	p9050	-0.182	-.51095**	-.79769***	-.86192***	-.62394***	-0.308	0.0302
earnings	varlog	-.37398*	-.63576***	-.84499***	-.78514***	-.43837**	-0.0161	0.290
disposable y	varlog	.54136**	.54875***	0.189	-0.223	-.62679***	-.75268***	-.47275**

Table 30: Cross-correlations private consumption inequality, SWE

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	0.00360	-0.335	-.68024***	-.76251***	-.64891***	-.44761**	-0.164
earnings	p9050	0.0983	-0.267	-.64299***	-.77558***	-.67679***	-.52781**	-0.260
earnings	varlog	-0.164	-.46965**	-.7604***	-.76629***	-.56928***	-0.297	0.00581
disposable y	varlog	.64706***	.55601***	0.302	0.128	-0.262	-.56554***	-.59135***

Table 31: Cross-correlations government consumption inequality, SWE

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	.50384**	.54163**	.37513*	0.0733	-0.331	-.61526***	-.73167***
earnings	p9050	.53758**	.55418***	.39174*	0.0735	-0.266	-.54708**	-.6722***
earnings	varlog	.51197**	0.332	0.152	-0.0768	-.40185*	-.58546***	-.62044***
disposable y	varlog	-0.174	0.178	.51001**	.70206***	.5803***	0.266	-0.206

Table 32: Cross-correlations unemployment inequality, SWE

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	0.0456	.41948*	.78632***	.9007***	.73464***	.41296*	0.0165
earnings	p9050	0.0122	.39731*	.75553***	.9038***	.76884***	.51392**	0.134
earnings	varlog	0.240	.56909***	.84698***	.89731***	.65707***	0.243	-0.189
disposable y	varlog	-.54349**	-.57488***	-0.351	0.0274	.48979**	.71748***	.59006***

Table 33: Cross-correlations share prices inequality, SWE

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
earnings	gini	-.45548**	-.68891***	-.59264***	-.41268*	-0.0671	.37518*	.57142***
earnings	p9050	-.47884**	-.69828***	-.65462***	-.46355**	-0.131	0.296	.58917***
earnings	varlog	-.57125***	-.68637***	-.59318***	-0.342	0.134	.582***	.6951***
disposable y	varlog	0.337	0.0876	-0.274	-.60031***	-.65153***	-0.303	-0.142

Table 34: Cross-correlations CPI inequality, USA

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	gini	0.108	0.0243	-0.134	-0.238	0.0888	0.100	-0.231
consumption	p5010	0.220	0.127	-0.0145	-0.284	-.52881**	-.48361**	-0.352
consumption	p9050	0.0738	0.0106	-0.0305	-0.263	-0.00209	0.196	-0.0814
consumption	varlog	0.206	0.0389	-0.156	-0.365	-0.202	-0.197	-0.310
earnings	gini	0.215	0.243	0.205	-0.0983	-.43485**	-.29792*	-0.00223
earnings	p5010	0.0162	.40273**	.55254***	0.240	-.35409**	-.5617***	-.35257**
earnings	p9050	0.224	0.121	0.0397	0.164	0.0113	-0.233	-0.266
earnings	varlog	0.156	.33876*	.30786*	0.0172	-.41496**	-.50554***	-0.246
hours work	varlog	0.0438	.40268**	.59165***	0.285	-0.265	-.55016***	-.41978**
hourly wage	gini	0.0963	0.0895	-0.00891	-0.221	-0.288	0.0232	.29175*
hourly wage	p5010	0.0896	-0.158	-.32105*	-0.0627	0.0434	0.00667	0.0857
hourly wage	p9050	0.274	.30195*	0.0578	-0.289	-.3131*	-0.104	-0.0609
hourly wage	varlog	0.130	0.0200	-0.174	-.37226**	-.31003*	0.0298	0.257
gross y	gini	0.179	.32003*	0.277	-0.0946	-.44741***	-.35135**	0.00751
gross y	varlog	0.142	.3361*	.31362*	0.0587	-.35122**	-.46959***	-0.231
disposable y	gini	.41011*	0.366	0.289	0.0924	-0.149	-0.259	-.40644*
disposable y	varlog	.39689*	.44058*	0.318	0.0696	-0.309	-.41943*	-0.327

Table 35: Cross-correlations GDP inequality, USA

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	gini	-0.199	-0.133	-0.333	-0.113	0.203	.40092*	0.299
consumption	p5010	-0.369	-.38984*	-0.293	-.40451*	-0.145	0.151	.56396***
consumption	p9050	-0.184	-0.141	-0.275	-0.0346	0.191	.40505*	0.173
consumption	varlog	-.38541*	-0.323	-.46189**	-0.245	0.113	.50399**	.55761**
earnings	gini	0.220	-0.0104	-0.258	-.44262***	-.41928**	-0.0388	0.0924
earnings	p5010	.40898**	.31381*	-0.0457	-.58138***	-.78722***	-.37512**	0.0788
earnings	p9050	.31381*	0.149	0.141	-0.0420	-.34644**	-0.230	-.33706*
earnings	varlog	0.272	0.0820	-0.231	-.61103***	-.68891***	-0.215	0.167
hours work	varlog	.47937***	.40952**	0.0447	-.50666***	-.8384***	-.53439***	-0.0489
hourly wage	gini	0.196	-0.0102	-0.173	-0.0720	0.0290	0.0859	-0.0836
hourly wage	p5010	0.0599	0.0101	0.0150	0.214	0.108	0.0297	-0.180
hourly wage	p9050	0.249	-0.0574	-0.239	-0.280	-0.145	-0.0295	-0.0165
hourly wage	varlog	0.172	-0.0524	-0.199	-0.00431	0.135	0.117	-0.115
gross y	gini	.32756*	0.0413	-.35544**	-.44077**	-.30801*	0.136	0.215
gross y	varlog	0.286	0.0649	-0.218	-.61548***	-.68062***	-0.223	0.160
disposable y	gini	0.327	0.0426	-.47659**	-.475**	-0.330	-0.145	-0.0682
disposable y	varlog	.3856*	0.0137	-.39107*	-.59571***	-.5605**	-.40923*	-0.112

Table 36: Cross-correlations private consumption inequality, USA

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	gini	-0.0657	-0.119	-0.329	-0.143	-0.0326	0.197	0.319
consumption	p5010	-.43769*	-.4317*	-0.372	-.41394*	-0.148	0.113	.52822**
consumption	p9050	-0.0241	-0.0932	-0.325	-0.0966	0.0143	0.261	0.258
consumption	varlog	-0.309	-0.314	-.48271**	-0.297	-0.0992	0.316	.58003***
earnings	gini	0.0716	-0.0696	-.32829*	-.39435**	-0.200	0.0531	0.0346
earnings	p5010	.38497**	0.236	-0.245	-.67946***	-.64247***	-0.218	0.168
earnings	p9050	0.117	0.0498	0.0429	-0.0606	-0.183	-0.132	-0.214
earnings	varlog	0.178	0.00558	-.33214*	-.60165***	-.49653***	-0.101	0.186
hours work	varlog	.47411***	0.291	-0.136	-.57353***	-.69251***	-.35458**	0.0375
hourly wage	gini	0.0322	-0.0194	-0.0893	0.0655	0.206	0.110	-0.217
hourly wage	p5010	-0.0560	0.0656	0.208	0.279	0.174	0.107	-0.130
hourly wage	p9050	0.110	-0.219	-.33234*	-0.147	0.0302	0.0192	-0.00445
hourly wage	varlog	-0.0124	-0.0819	-0.0642	0.200	.35209**	0.207	-0.166
gross y	gini	0.169	-0.0586	-.436**	-.4115**	-0.153	0.195	0.177
gross y	varlog	0.229	0.000977	-.32909*	-.61845***	-.5228***	-0.135	0.156
disposable y	gini	0.255	-0.00150	-.51412**	-.50772**	-.42077*	-0.241	-0.108
disposable y	varlog	0.321	-0.0307	-.42975*	-.55005**	-.53273**	-.42218*	-0.204



Table 37: Cross-correlations government consumption inequality, USA

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	gini	0.122	0.00688	-0.0546	-0.0769	-0.282	-0.171	0.0736
consumption	p5010	-0.276	-.42372*	-.46284**	-.42484*	-0.292	-0.265	-0.0600
consumption	p9050	0.131	0.0409	-0.0742	0.0243	-0.136	-0.138	-0.0101
consumption	varlog	-0.0705	-0.233	-0.289	-0.261	-0.364	-0.228	0.0385
earnings	gini	0.136	0.263	0.0976	-0.0137	-0.0339	-0.240	-0.244
earnings	p5010	0.282	0.186	0.0846	0.0310	-0.0606	-0.264	-.34729**
earnings	p9050	0.00796	.30851*	0.248	0.0738	0.103	0.0678	0.0941
earnings	varlog	0.193	0.202	0.129	0.0356	-0.0798	-0.276	-.30451*
hours work	varlog	0.249	0.232	0.133	0.0897	0.0406	-0.184	-0.278
hourly wage	gini	0.158	.44089**	.31453*	0.185	0.164	0.0253	-0.0415
hourly wage	p5010	0.0277	0.268	.31209*	.29874*	.30481*	.4149**	.33457*
hourly wage	p9050	0.0378	0.262	.30717*	0.161	0.0238	-0.0840	0.0348
hourly wage	varlog	0.159	.45655***	.41467**	.33336*	.30892*	0.249	0.207
gross y	gini	0.0641	0.205	0.0260	-0.140	-0.156	-0.218	-0.147
gross y	varlog	0.255	0.255	0.151	-0.00219	-0.159	-.38522**	-.40741**
disposable y	gini	0.179	0.229	-0.0486	-0.301	-0.359	-0.360	-0.249
disposable y	varlog	0.328	0.305	0.154	-0.0932	-0.200	-0.359	-.39506*

Table 38: Cross-correlations unemployment inequality, USA

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	gini	0.261	0.0835	0.128	0.0202	-0.370	-.39484*	-0.115
consumption	p5010	0.353	.38899*	0.215	0.321	0.229	-0.211	-.51245**
consumption	p9050	0.173	0.0569	0.0795	0.0304	-0.271	-0.350	-0.105
consumption	varlog	.4096*	0.262	0.230	0.147	-0.223	-.45155**	-.40328*
earnings	gini	-0.246	0.0623	0.248	.45832***	.47339***	0.00863	-0.279
earnings	p5010	-.38746**	-.32416*	-0.00286	.5326***	.83953***	.4288**	-0.117
earnings	p9050	-.40232**	-0.154	-0.0979	0.0139	.36519**	.29148*	.29614*
earnings	varlog	-0.247	-0.0552	0.227	.58741***	.7118***	0.201	-0.270
hours work	varlog	-.42869**	-.41843**	-0.0574	.46962***	.88825***	.59777***	0.00829
hourly wage	gini	-0.218	0.0717	0.194	0.131	0.00939	-0.173	-0.113
hourly wage	p5010	-0.161	0.101	0.0894	-0.143	-0.133	0.0341	0.117
hourly wage	p9050	-0.272	-0.0283	0.262	.35278**	0.152	-0.0674	-0.0601
hourly wage	varlog	-0.236	0.0807	0.267	0.129	-0.0679	-0.185	-0.0554
gross y	gini	-.32391*	-0.0741	0.210	.37376**	.33497*	-0.104	-.29652*
gross y	varlog	-0.246	-0.0577	0.224	.54632***	.68433***	0.176	-0.257
disposable y	gini	-0.277	0.00848	0.313	.40159*	0.293	0.103	-0.0314
disposable y	varlog	-0.304	0.0338	.44143*	.61741***	.55854**	0.253	-0.110

Table 39: Cross-correlations share prices inequality, USA

inequality	index	t_3	t_2	t_1	t	t1	t2	t3
consumption	gini	-.42253*	-0.366	-.4443**	0.0358	0.375	.57971***	.40671*
consumption	p5010	-.45609**	-0.223	-.44512**	-0.164	0.203	.41275*	0.289
consumption	p9050	-.40679*	-0.337	-0.277	0.0510	.43522*	.48476**	0.258
consumption	varlog	-.55495**	-.53762**	-.55311**	-0.0320	.49758**	.74288***	.5246**
earnings	gini	0.00842	0.102	-0.0246	-0.280	-.30313*	-0.0938	-0.0813
earnings	p5010	0.142	-0.0249	-0.142	-.35168**	-0.291	-0.123	-0.0752
earnings	p9050	0.217	.40183**	.47364***	-0.0479	-0.246	-0.242	-.34154*
earnings	varlog	0.126	-0.0896	-0.187	-.40966**	-.34673**	-0.136	0.0408
hours work	varlog	0.253	0.151	-0.0968	-.34206*	-.43277**	-.29774*	-0.217
hourly wage	gini	0.124	0.148	0.159	-0.0311	-0.196	-0.183	-0.179
hourly wage	p5010	0.115	0.0323	0.276	0.142	-0.234	-0.143	-0.180
hourly wage	p9050	-0.00551	0.142	0.0766	0.0430	-0.0427	-0.215	-0.200
hourly wage	varlog	0.214	0.217	0.268	0.126	-0.144	-0.284	-0.281
gross y	gini	0.0594	0.00237	-0.0344	-0.169	-0.0960	0.122	0.0891
gross y	varlog	0.0790	-0.119	-0.192	-.44756***	-.34844**	-0.0963	0.0771
disposable y	gini	-0.220	-0.302	-0.341	-0.40148*	-0.318	0.0988	0.251
disposable y	varlog	-0.0590	-0.304	-.42474*	-.55116**	-.57522***	-0.292	0.0445

Table 40: Granger-causality (GC) tests.

Country	CPI GCs inequality	Inequality GCs CPI
CAN	ALL	ALL (varlog yd)
GER	P5010, P9050 yd	ALL (yd)
GBR	varlog hw, gini e, varlog e, P5010 e	ALL (P5010 e)
NED		ALL
SWE	yd	e
USA	hw, P9050 e	yd, c
Country	GDP GCs inequality	Inequality GCs GDP
CAN		ALL
GER	gini y, gini hw, wages	wages, varlog hw
GBR	hw, e	
NED		ALL
SWE	ALL	yd
USA	yd, c (P5010)	ALL (w, gini y)
Country	Priv. consumption GCs inequality	Inequality GCs priv. consumption
CAN	varlog y and varlog earnings	ALL (varlog earnings)
GER	n.a	n.a
GBR	hw, gini e	
NED	pola yd and gini yd	ALL (pola yd)
SWE	e	yd
USA	hw, gini y, yd, P5010 e, c (P5010)	hw, P5010 e
Country	Gov. consumption GCs inequality	Inequality GCs gov. consumption
CAN	e	varlog y, varlog hw
GER	wages, gini hw, gini y and gini yd	wages
GBR	varlog w, varlog e	
NED	ALL	gini yd, theil yd
SWE		
USA	gini e, yd	gini e, c (P5010)
Country	Share prices GCs inequality	Inequality GCs share prices
CAN		ALL
GER	varlog e, gini y, varlog yd, P9050 yd	varlog hw P5010 hw, P9050 e
GBR	ALL (P5010 e)	gini e, P5010 e
NED	gini yd, theil yd	
SWE		yd
USA	P9050 e, gini c	P5010 w, varlog c
Country	Unemployment GCs inequality	Inequality GCs unemployment
CAN		ALL
GER	gini hw, P5010 hw, P9050 yd, P5010 yd	ALL (gini hw, P9050 yd, P5010 yd)
GBR	hw, gini e, varlog e	ALL
NED		gini yd, theil yd
SWE	e	yd
USA	varlog hw, varlog yd	ALL (w)

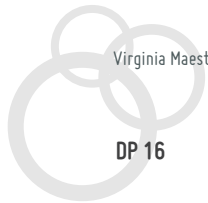
Legend: "ALL", all inequality series; "ALL (...)" all inequality series but the ones in parenthesis; "n.a." not available; "yd" disposable income; "hw" hours of work; "e" earnings; "c" consumption; "w" wages.



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Olivier Pintelon, Bea Cantillon, Karel Van den Bosch and Christopher T. Whelan
September 2011

- DP 12** **Factor Components of Inequality. A Cross-Country Study**
Cecilia García-Peñalosa and Elsa Orgiazzi
July 2011

- DP 11** **An Analysis of Generational Equity over Recent Decades in the OECD and UK**
Jonathan Bradshaw and John Holmes
July 2011

- DP 10** **Who Reaps the Benefits? The Social Distribution of Public Childcare in Sweden and Flanders**
Wim van Lancker and Joris Ghysels
June 2011

- DP 9** **Comparable Indicators of Inequality Across Countries (Position Paper)**
Brian Nolan, Ive Marx and Wiemer Salverda
March 2011

- DP 8** **The Ideological and Political Roots of American Inequality**
John E. Roemer
March 2011

- DP 7** **Income distributions, inequality perceptions and redistributive claims in European societies**
István György Tóth and Tamás Keller
February 2011

- DP 6** **Income Inequality and Participation: A Comparison of 24 European Countries + Appendix**
Bram Lancee and Herman van de Werfhorst
January 2011

- DP 5** **Household Joblessness and Its Impact on Poverty and Deprivation in Europe**
Marloes de Graaf-Zijl
January 2011

- DP 4** **Inequality Decompositions – A Reconciliation**
Frank A. Cowell and Carlo V. Fiorio
December 2010

- DP 3** **A New Dataset of Educational Inequality**
Elena Meschi and Francesco Scervini
December 2010

- DP 2** **Are European Social Safety Nets Tight Enough? Coverage and Adequacy of Minimum Income Schemes in 14 EU Countries**
Francesco Figari, Manos Matsaganis and Holly Sutherland
June 2011



DP 1 **Distributional Consequences of Labor Demand Adjustments to a Downturn. A Model-based Approach with Application to Germany 2008-09**
Olivier Bargain, Herwig Immervoll, Andreas Peichl and Sebastian Siegloch
September 2010





Information on the GINI project

Aims

The core objective of GINI is to deliver important new answers to questions of great interest to European societies: What are the social, cultural and political impacts that increasing inequalities in income, wealth and education may have? For the answers, GINI combines an interdisciplinary analysis that draws on economics, sociology, political science and health studies, with improved methodologies, uniform measurement, wide country coverage, a clear policy dimension and broad dissemination.

Methodologically, GINI aims to:

- exploit differences between and within 29 countries in inequality levels and trends for understanding the impacts and teasing out implications for policy and institutions,
- elaborate on the effects of both individual distributional positions and aggregate inequalities, and
- allow for feedback from impacts to inequality in a two-way causality approach.

The project operates in a framework of policy-oriented debate and international comparisons across all EU countries (except Cyprus and Malta), the USA, Japan, Canada and Australia.

Inequality Impacts and Analysis

Social impacts of inequality include educational access and achievement, individual employment opportunities and labour market behaviour, household joblessness, living standards and deprivation, family and household formation/breakdown, housing and intergenerational social mobility, individual health and life expectancy, and social cohesion versus polarisation. Underlying long-term trends, the economic cycle and the current financial and economic crisis will be incorporated. Politico-cultural impacts investigated are: Do increasing income/educational inequalities widen cultural and political 'distances', alienating people from politics, globalisation and European integration? Do they affect individuals' participation and general social trust? Is acceptance of inequality and policies of redistribution affected by inequality itself? What effects do political systems (coalitions/winner-takes-all) have? Finally, it focuses on costs and benefits of policies limiting income inequality and its efficiency for mitigating other inequalities (health, housing, education and opportunity), and addresses the question what contributions policy making itself may have made to the growth of inequalities.

Support and Activities

The project receives EU research support to the amount of Euro 2.7 million. The work will result in four main reports and a final report, some 70 discussion papers and 29 country reports. The start of the project is 1 February 2010 for a three-year period. Detailed information can be found on the website.

www.gini-research.org





GINI GROWING INEQUALITIES' IMPACTS

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Project funded under the
Socio-Economic sciences
and Humanities theme.