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INEQUALITY IN EMU: IS THERE A CORE PERIPHERY DUALISM?

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Inequality in EMU: is there a core periphery dualism?

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Abstract

Income inequality has had a minor role in the European integration process' institutional framework. This is particularly unfitting given that reducing disparities has been one of the most explicit and firm goals of the EU, which has consequently devoted an increasing share of its budget to regional policy. This issue has potentially relevant policy implications as recently often underlined by the OECD reports because if the European integration has a role in increasing inequalities within member countries it is harmful for social cohesion . As a matter of fact, inequality concerns boost protest vote, in combination with other factors. This paper intends to assess inequality determinants in EMU countries and whether the European integration process has been itself among them. It performs an empirical investigation on a panel of 12 EMU member States in the period 1980 and 2015. The contribution of this paper to the existing literature in twofold: first, it focuses on the effects of European integration on inequality in EMU countries over the last 25 years, on which the evidence is still scarce. Second, it tries to disentangle the European integration impact on inequality in core and periphery EMU members countries in order to investigate the so called "core periphery dualism" determinants.

Keywords: Income inequality, core-periphery dualism, financial integration, trade openness, panel data analysis

JEL Classification: D63, D31, 015, H23

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Introduction

Over the last two decades income inequality reduction policies between and within countries has had a minor role in the European Institutional framework. This is particularly unfitting given that reducing disparities has been promoted as one of the most explicit and firm goals of the EU, which has consequently devoted an increasing share of its budget to regional policy over time. This issue has potentially relevant policy implications because if the European integration process has a role in increasing inequalities within member countries it could determine social discontent and rise risks to political break up. In fact, inequality concerns can boost protest vote, in combination with other factors. Moreover, identifying the causes of inequality is fundamental to implementing policy measures that might allow for a more equalized and inclusive society[1].

Although the attention declared by the European Institutions, income inequality targets are not explicitly included in European main provisions (i.e. Macroeconomic Imbalances Procedure or Stability and Growth Pact). Moreover, empirical evidence shows that income inequality in most European countries has been increasing over time, especially after the introduction of the single currency. For example, the OECD, reports[2] that income inequality and poverty have grown faster in Germany since 2000, than in any other OECD country. They increased by more in five years (2000-2005) than in the previous 15 combined (1985-2000). Baldini (2014) finds that the inequality in Italy that had already been increasing in the last twenty years was furthermore exacerbated by the austerity measures introduced after the 2008 and 2011 crises. Andriopoulou E. et al. (2017), using EU SILC survey data found that there was a decline in the income shares of the two lowest and the top decile in Greece; Arnold and Rodigues (2018) analyzed income inequality in Portugal over the years 2004-2012 and found that Portugal is one of the EMU countries with most unequal income distributions and highest poverty levels. They also find that the economic crisis has halted a long-term gradual decline in both inequality and poverty detecting.

This paper analyses the main inequality determinants in EMU countries performing an empirical investigation on a panel of 12 Member States in the period 1980 and 2015. The contribution of this paper to the existing literature in twofold: first, it focused on the effects of European integration on inequality in EMU countries over the last 25 years, on which the evidence is scarce. Second, it tries to identify the separate effects of European integration on core and periphery EMU countries shedding light on the mechanisms behind the so called "core periphery dualism".

The paper consider the European process mostly for what concerns trade and financial integration therefore it draws mostly on two different, though related, strands of empirical research. The first examines countries disparities and inequalities in conjunction with the European Economic integration process. Most of the empirical literature accounts that the process of absolute convergence observed for decades in Europe slowed to almost a halt during the 1980s and early 1990s (Boldrin and Canova, 2001), in coincidence with the intensification of the European integration process.

There is no consensus in the empirical literature regarding the impact of European Integration on inequality. Most of the papers published in the 1990s use country-level data to argue that European regions experience convergence in terms of income levels (EC, 1997). However,

[1] For a recent survey of literature on inequality drivers see Bourguignon F. (2017)
[2] OECD (2008)

these studies seldom consider European integration as a separate factor affecting income inequality. In the mid-2000s, the conjecture of convergence of income by "clubs" assessed that European regions can be divided into groups based on per capita GDP and that convergence took place only within these groups (Magrini, 2004; Beblo and Knaus, 2001). More recent papers use panel data econometric technique to evidence potential reasons for rises in inequality in the EU (Bouvet, 2010; O'Connor, 2005). The majority of them analyse social, political and institutional variables that are accountable for the increase in disparities within EU countries. Only a few focus specifically on the impact of European Integration on inequality (Asteriou et al 2014).

The second strand of literature refers to the impact of trade and financial integration on inequality. Kraay (2006) and Goldberg-Koujianou and Pavcnik (2007) after reviewing a large number of studies and various measures of trade openness (degree of trade protection, the share of imports and/ or exports in GDP) found a strong positive link between trade openness and inequality. On the contrary, trade openness was associated with a reduction in inequality from a panel of 51 developed and developing countries over the period 1981–2003 by the IMF (2007) and by Wu and Hsu (2012). D'Elia and De Santis (2018) observed that in 36 OECD countries in the period 1995-2015, trade openness decreased inequality, but only in low and middle income countries.

As for financial integration, greater capital account liberalization may increase access to financial resources for the low income countries reducing inequality (Beck et al., 2007). IMF (2007) observe contrasting effects from the different components of financial globalization, with the net result depending on the relative strength of the individual effects. Recently, D'Elia and De Santis (2018) found that in OECD countries financial openness in the period 1995-2015 increased inequality in the short term in lower income countries and in the long term in higher income countries.
The paper is organized as follows. Section 2 reports the main stylized facts on inequality in EMU countries. Section 3 describes equations, dataset and empirical strategy. Section 4 presents the econometric results, while section 5 reports robustness checks. Conclusions and policy implications follow.

3. Stylised facts: is there a core periphery dualism in European income inequality trends?

Income inequality has increased in many advanced economies over the past two decades. The Gini index[3] computed on disposable income (income after taxes and benefits) has been increasing on average in EU countries since the early 1980s from around 28 to 31, with little variation since 1995 (chart1). This picture however masks high heterogeneity at country level within EU and since 1999 in EMU.

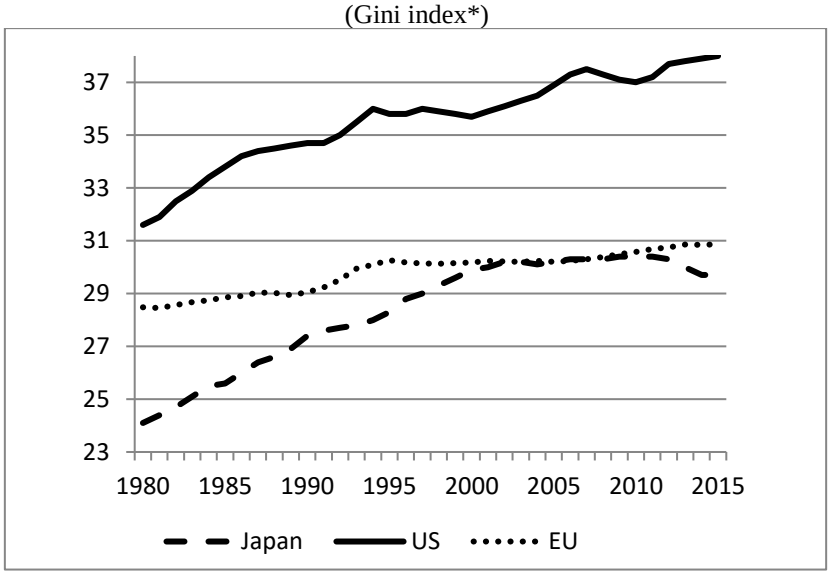
The global financial and sovereign debt crises hindered the European convergence process and the income distribution within countries. The weak economic performance of the EU members over the last decade had a clear impact on economic conditions of individuals, affecting their employment conditions, income levels and social protection benefits.

[3] The benchmark for the Gini index is the equidistribution of income among the individuals, that could differ from the social preferences about income inequality. Thus an increase of the index could reflect also a change in the attitude toward income disparity. Despite presenting some limits, the Gini index is intensively used to measure inequality in empirical estimates.

There are several drivers of increasing inequalities especially after the creation of the EMU. Among the others low labour force participation rates, persistently high unemployment, fading of social protection and an uneven diffusion of productivity improving technologies This has been combined with fiscal and welfare systems under increased pressure because of the so called "fiscal austerity" implemented to meet European Treaties requirements. Another issue is linked to the increasing skill-bias in income, with low salary increases for low-skilled and part-time workers and large income increases for high-skill jobs. An additional driver is the near-zero interest rate environment, with low returns requested on investment, that favored capital incomes. Demographic pressure and rapid ageing also play a key role, both for the sustainability of welfare systems and for the evolving composition of households making them potentially more exposed to poverty. The policy mix has been moderately progressive in most EMU Member States and partially countercyclical[4], but not enough to smooth income inequality.

Chart 1 Income inequality in main advanced countries/areas (1980-2015)

(Gini index*)



Source: World Bank, Solt (2016)

*EU includes the 28 EU countries, the Gini index for the group is a weighted average using the GDP as weight.[5]

The asymmetric growth trajectories of European economies during and after the crises have also prompted the idea that the European convergence process somehow had stopped. Signs of growing divides have been emerging across the EMU members reinforcing the evidence of the so called "core periphery dualism"[6]. In fact, the decline of disposable income in Southern "peripheral" countries relative to the rest of the EMU has put this process at a halt. However,

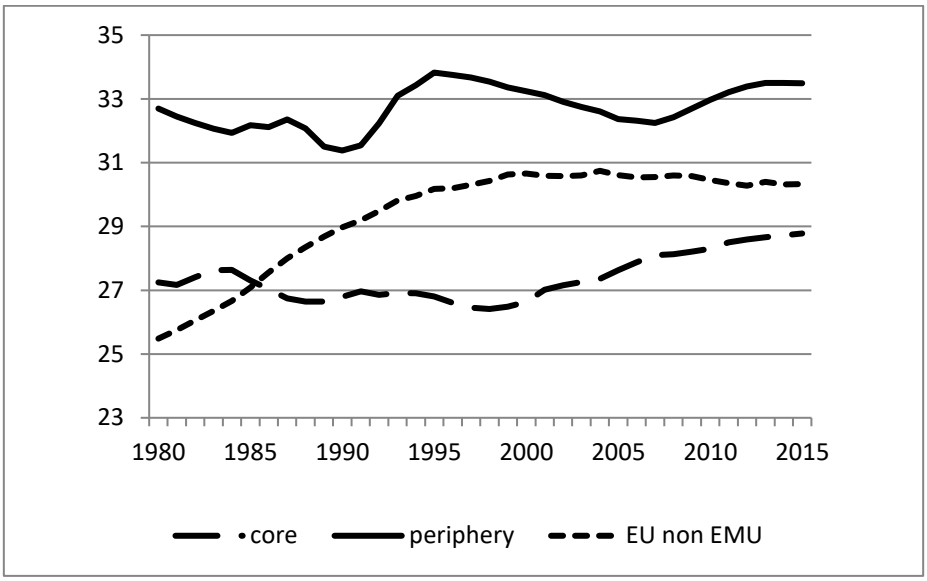
[4] "*Taking into account recent cases of fiscal consolidation, market income inequality increased over fiscal consolidation periods (IMF 2014). European countries followed diversified paths of fiscal consolidation. Avram et al. (2013), by analysing nine EMU countries implementing fiscal consolidation packages, show that the impact of these strategies on disposable income has ranged from 1% to 11%, with differentiated policy mixes across countries and the common strategy of VAT increase. However, adjustment measures contributed to a decrease of inequality or to offset partially the increase in inequality in a large majority of countries (i.e. Portugal, Netherlands and Germany). Some measures are found to be progressive, in particular cuts in untargeted benefits and public sector wage cuts and, to some extent, increases in income tax. Instead, proportional reductions in pensions and increases in VAT are found regressive. Some progressivity is found in the fiscal consolidation packages of Greece, Spain, Portugal, and moderately in Italy*". (Darvas et al. 2014).

[5] In chart 1 we consider the 28 EU countries (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom).

[6] See Campos Macchiarelli (2016 and 2018) Caporale et al (2015) and Cesaroni and De Santis (2017 and 2018).

the result of these heterogeneous trends is that on average inequality in EU countries since the 80s has not increased significantly (chart 1).

Chart 2 Income inequality dynamic EMU (1980-2015)
(Gini index)



Source: World Bank, Solt (2016)
Core: Germany, Austria, the Netherlands, Belgium, Finland and France
Periphery: Italy, Spain, Portugal, Ireland and Greece
EU non EMU: Denmark, Sweden, UK

There is evidence, however, that the response of inequality to globalization and growth was different among European countries, that broadly correspond to the so called "core" and "periphery" countries respectively (chart 2). These countries are dissimilar not only for their inequality degree, growth dynamics and international openness, but also because the relationships among the former variables are not the same.

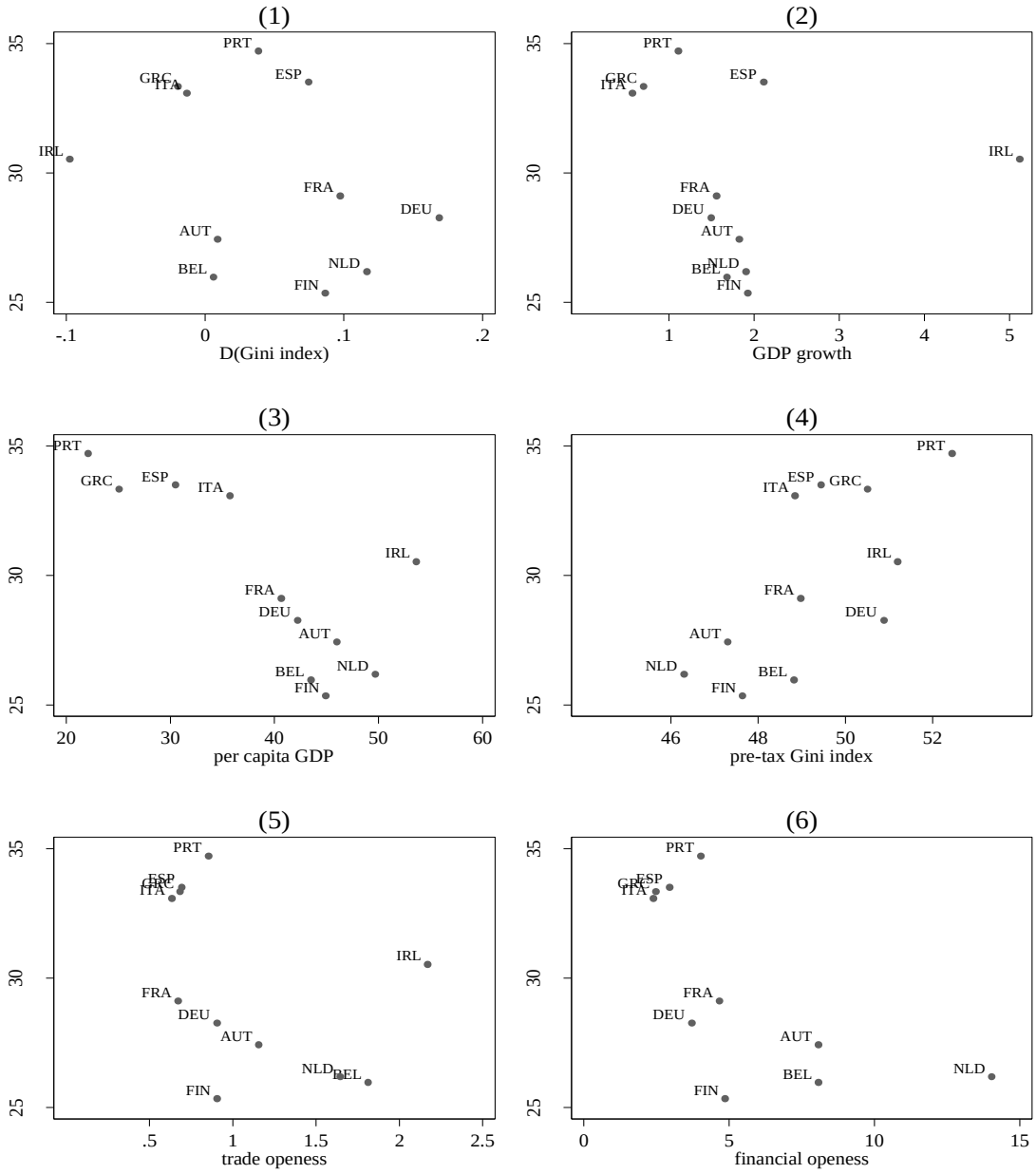
For instance, panel (1) of chart 3 shows that on average in the period 1999-2015 the Gini Index (GI) is higher and quite homogeneous (around 33) in the periphery and it seems also less responsive to the corresponding changes of the index over time, as expected when the inequality is a structural feature of each country and is subject to no convergence or divergence process. Differently, the core countries display heterogeneous and diverging income inequality, the Gini index ranges between 25 in Finland and 30 in France (i.e.; the Gini index is generally higher where it increases faster). This evidence suggests that the adjustment of income distribution is mainly driven by country specific factors. Ireland stands out as an outlier.

Panel (2) shows that in the periphery the inequality is not strictly related to the GDP growth and countries with different GDP growth have the same inequality level. Within core countries higher GDP growth is associated to lower inequality. This conjecture is strengthen by the evidence presented in panel (3), where higher levels of per-capita income (at constant prices) are associated to lower inequality in core countries, but not in the periphery. Ireland always stands out as an outlier.

Also the Government propensity to reduce income inequality appears to be different between the two groups of countries, as shown in the panel (4). In the periphery, the inequality of

disposable incomes (i.e.: evaluated after tax and social benefits) is less correlated to the dispersion generated by the market, suggesting that the re-distributive policies were relatively successful. In the core countries, the initial income dispersion has been reduced to a lesser amount, even though the final distribution of income seems to be uniform.

Chart 3 Inequality, per capita income and globalization indicators in EMU countries (averages 1999-2015)



Source: authors elaborations on Thompson Reuters Datastream

The effect of trade openness, reported in the panel (5) is heterogeneous in two groups. While in the core greater international trade is related to lower income inequality, in the periphery the relationship is positive: greater trade openness corresponds to greater inequality. Eventually, the panel (6) shows that financial openness tends to polarise the income

distribution in the periphery, while has a weak negative relationship with inequality in the core countries[7].

4. Empirical strategy and dataset

The previous section presents some stylised facts based on binary comparisons between the country averages of some relevant factors explaining the level and dynamics of income inequality. The interaction among the same factors and the variability along the time can be analysed only by estimating a regression model on a panel of EMU countries.

A linear model that explains the variability of the Gini index (G_{it}) along time and across the country is represented by the following equation:

$$G_{it} = \sum_j \beta_j x_{jit} + \delta_i + \theta_t + u_{it} \qquad [1]$$

The model includes the explanatory variables x_{jit}; a set of country dummies δ_i representing time invariant country specific omitted variables; the time dummies θ_t representing common time-varying factors not included in the model; the idiosyncratic term u_{it}.

Taking into account the literature surveyed in Section 2, the explanatory variables in the baseline model are:

i) per-capita income growth at constant prices (henceforth: *dy*), that captures either a possible trade-off between growth and inequality or the complementarity relationship;

ii) the unemployment (*unr*),that is acknowledged as one of the major driver of inequality (namely between employed persons earning wages and profits and unemployed persons possibly receiving only social allowances almost unrelated to productivity growth).[8]

iii) the tax and social security contributions, as a percentage of GDP (*taxq*), that ideally measure the size of the secondary distribution of income that is the Government intervention in the Economy to redistribute resources;

iv) The logarithm of per capita income level (LGDPV) that is used as an indicator of catching up and convergence.

We included in our baseline equation two indicators of the globalization effect: the trade openness (*trade_open*) and financial openness (*fin_open*). Following (Busse Konninger, 2012) we use *trade_open* calculated as exports and imports of goods and services in current US$ divided by total GDP in current US$ lagged by one period. Standard trade theory predicts that trade openness should reduce the wage gap between skilled and unskilled labor in developing countries, resulting in a reduction of income inequality (as predicted by the Stolper–Samuelson theorem). For an advanced economy, however, in which high-skill factors are relatively abundant, the reverse would hold. Trade openness may also worsen income

[7] Ireland is excluded from the graph because its financial openness exceeds 15 times the GDP, since many headquarters of financial corporations are based there

[8] The use of unemployment rate instead of employment rate is more consistent with the theoretical models described in the literature. Furthermore, the possibility of having different unemployment definitions for various countries analyzed is overcome by the standardization of the statistical data used by the European Commission.

inequality because of disparities in returns to education and skills . Therefore, there is no definite theoretical conclusion on the relationship between trade openness and inequality.

As for the financial openness (*fin_open*) we used a de facto indicator Net foreign assets + liabilities ((NFA+NFL)/GDP_{t-1}.). We did not use the Chin Ito index, which is a de iure index of financial integration, because it has a very low variability after 1995 across EMU members and available data end in 2011.[9]

Table with data description, sources and descriptive statistics of the variables is provided in the appendix.

Since some of the variables explaining the variability of the Gini index are arguably influenced by income inequality, they cannot considered strictly exogenous, thus an IV estimator has been applied to get consistent estimates of the parameters. We instrumented the variables using their first lag. We are conscious that a certain degree of collinearity in the regressors can occur, however the usual collinearity tests (i.e. VIF) show that in our estimations it doesn't affect the overall fit of the model or produce bad predictions

In particular, the Gini index could influence the dynamics of per-capita income and the fiscal pressure, that is arguably determined also by the required flows of social benefits needed to reduce the inequality ingenerated by the market transactions. On the basis of the qualitative evidence presented in the Section 3, the equation [1] has been estimated for the core and periphery countries group separately, to check if the explanatory variables have different effects on inequality, as suggested by chart1.

The dataset is taken from four main sources:

i) the WEO database, that collects national accounts, data on the labour market, and the main items of the government balance sheet for the member of the OECD countries, with forecasts for the most recent data unavailable yet;

ii) the Standardized World Income Inequality Database, built by Solt (2016) for the Gini index, that has the advantage of being more comparable among countries than other indicators of inequality, as those based on the quantiles of the income distribution;

iii) the External Wealth of Nations II database on the stock of financial assets and liabilities of OECD countries, by Milesi Ferretti (2017) and updated up to 2017 by his courtesy, that provides a *de facto* indicator of financial openness.

iv) the WGI database of the World Bank on the quality and effectiveness of institutions, described by Kaufmann, Kraay and Mastruzzi (2010).

Missing data (particularly on the Gini index and financial openness) were interpolated by using the Kernel-weighted local polynomial smoothing estimator described by Fan and Gijbels (1996). All variables are in logarithmic terms.

[9] One of the drawbacks connected with de facto measures is that the choice in favour of one of them leaves the information contained in all the others de facto measures aside. On the other hand, the de jure indicators, even though in a majority of cases they are based on summary information revealed in the IMF's AREAER reports, should in principle contain more complete information on the formal – and potentially also on actual – financial liberalization than de facto measures do. Consequently, especially in the case of more developed economies, to the extent to which de jure financial openness leads also to de facto liberalization episodes, the former could be to a certain degree treated as a proxy for the latter.

5. Estimates results

Table 1 presents the estimates results for the whole period (1980-2015) and for the post euro period (1999-2015). In our analysis we consider the 12 EMU countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, Spain). Relying on the qualitative evidence presented above, we disentangled the sample in two groups with more homogeneous characteristics,– "core" (Luxemburg, Germany, Austria, the Netherlands, Belgium, Finland, and France) and "periphery" (Italy, Spain, Portugal, Ireland and Greece) countries – according to the prevailing definition in the literature[10].

We estimated the equation 1 separately for core and periphery in order to assess whether the relationship with regressors is heterogeneous thus suggesting the presence of a core periphery dualism.

The dependent variable in all regressions is the log of the Gini coefficient, therefore a positive (negative) coefficient indicates an increase (decrease) in inequality. For the EMU sample, on average, in the period 1980-2015 GDP growth is not correlated with inequality, while unemployment rate, trade openness[11] and public expenditure display a negative relationship with the Gini index (GI) (increased inequality). Looking at the results in table 1 financial integration shows a negligibly positive coefficient presenting a negative association with the Gini index. However, robustness checks excluding Ireland from the periphery group indicate that financial integration had a negative impact on inequality. Therefore, differently to other peripheral countries Ireland experimented strong FDI inflows starting from the first half of 90s'(see chart 5 in the appendix).

The impact of regressors in core and periphery countries was, as expected, heterogeneous. Per capita income growth had a negative correlation with the GI in core countries while increasing it in peripheral ones; the unemployment rate, as expected, is positively related to inequality in both group but the coefficient had a greater magnitude for peripheral countries.

This result can be justified by the fact that the more unemployment there is (on average unemployment rate is higher in periphery than in core countries) the less disposable income households in the lower part of the distribution have, increasing disparities in the society. Taxes and social security contributions, trade openness and financial openness are negatively associated with inequality only in peripheral countries.

If we consider the post euro period for the EMU countries as a whole the only differences with respect to the entire period results are:

i) the magnitude of coefficients with few exceptions are greater after the 1998 and ii) the fact that trade openness is negatively correlated to inequality also in core countries.

Financial openness and the share of tax and social security contributions on GDP display a negative relationship with inequality only in peripheral countries. The former suggests that the more the government spends on social protection and non-market services, the lower is income inequality.

[10] See Campos Macchiarelli (2016 and 2018) Caporale et al (2015) and Cesaroni and De Santis (2017 and 2018).
[11] This result is in line with Goldberg-Koujianou and Pavcnik, 2007 and Kraay, 2006.

Table 1 IV Estimates results: trade and financial integration and inequality

	(1)	(2)	(3)	(4)	(5)	(6)
	1980-2015			1998-2015		
VARIABLES	EMU12	core	peri	post98 EMU12	post98 core	post98 peri
dy	0.00340	-0.238***	0.166***	-0.0811	-0.281***	0.163***
	(0.0918)	(0.0900)	(0.0388)	(0.0820)	(0.0926)	(0.0405)
UNR	0.00289***	0.00382**	0.00462***	0.00358***	0.00623***	0.00455***
	(0.000707)	(0.00149)	(0.000295)	(0.000751)	(0.00137)	(0.000301)
TAXQ	-0.00152	0.000899	-0.00219***	0.000728	0.00104	-0.00217***
	(0.00186)	(0.00214)	(0.000793)	(0.00191)	(0.00200)	(0.000806)
LGDPV_PC	0.166***	0.444***	0.00245	0.270***	0.652***	0.00316
	(0.0577)	(0.0752)	(0.0165)	(0.0747)	(0.0806)	(0.0201)
trade_open	0.0488***	0.00990	-0.0263***	0.0227	-0.0289*	-0.0205**
	(0.0140)	(0.0160)	(0.00867)	(0.0156)	(0.0154)	(0.00946)
fin_open	-0.000511**	-0.000230	-0.00247***	-0.000307	000148	-0.00276***
	(0.000238)	(0.000168)	(0.000448)	(0.000257)	(0.000175)	(0.000469)
Observations	228	133	95	204	119	85
R-squared	0.402	0.704	0.825	0.422	0.711	0.834
Number of cod	12	7	5	12	7	5
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
estat	0.182	6.074	2.515	0.00693	8.383	1.523
estatp	0.670	0.0137	0.113	0.934	0.00379	0.217
idstat	61.38	38.88	36.63	60.39	35.78	32.75
idp	2.34e-06	0.00458	0.00883	9.06e-07	0.00490	0.0121

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The latter results in conjunction with the positive relationship between government expenditure and inequality might indicate that European economic integration's inequality effects are due to less generous social policy and that some of the increase in country economic output due to an increase in public expenditure might reflect smaller inefficiency losses deriving from income redistribution.

6. The role of institutional quality, trade agreements and global financial crisis

In this paragraph, we provide estimates robustness checks introducing in the original specification (table 1) two additional regressors: i) an institutional variable on government effectiveness (*gee*) which refers to the capacity of a government to effectively formulate and implement sound policies, taken from the World Governance Indicators of the World Bank[12], ii) a euro dummy (*euro*) proxing a full economic integration among countries.

For what concerns the institutional quality indicator, in interpreting the analysis we need to take into account all the caveats associated with the use of signals coming from qualitative survey indicators. We included in the estimates also a financial crisis dummy which proved to

[12] The WGI comprises six governance indicators that combine the views of a large number of enterprises, citizens and expert survey respondents in industrial and developing countries. They are based on over 30 individual data sources produced by a variety of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms. Estimates of governance ranges from approximately -2.5 (weak) to 2.5 (strong) performance. For a full methodological explanation see Kaufmann, Kraay and Mastruzzi (2010). The indicators are available for the period 1996-2016.

be not statistically significant probably because it overlaps with the year dummies used as controls.

Table 2 IV Estimates results: inequality and institutional quality (1996-2015)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	EMU12	core	peri	EMU12	core	peri
dy	-0.117	-0.200**	0.151***	-0.119*	-0.156*	0.104**
	(0.0753)	(0.0977)	(0.0405)	(0.0704)	(0.0828)	(0.0422)
UNR	0.00387***	0.00306*	0.00455***	0.00387***	0.000303	0.00440***
	(0.000786)	(0.00181)	(0.000337)	(0.000753)	(0.00173)	(0.000334)
TAXQ	0.00132	0.00191	-0.00217***	0.0102***	0.00771	-0.00303*
	(0.00194)	(0.00214)	(0.000837)	(0.00212)	(0.00537)	(0.00156)
LGDPV_PC	0.263***	0.511***	0.00449	0.251***	0.397***	-0.0188
	(0.0763)	(0.0875)	(0.0254)	(0.0662)	(0.0676)	(0.0306)
trade_open	0.0349**	-0.0194	-0.0220**	-0.251***	-0.314***	-0.0128
	(0.0175)	(0.0172)	(0.0106)	(0.0421)	(0.0566)	(0.0278)
fin_open	-0.000456	6.20e-05	-0.00274***	0.00199**	0.00309***	-0.00874***
	(0.000279)	(0.000187)	(0.000501)	(0.000895)	(0.000808)	(0.00205)
gee	0.0200	-0.0379	-0.00236	0.137*	-0.0883	-0.0611
	(0.0127)	(0.0230)	(0.00585)	(0.0724)	(0.166)	(0.0468)
TAXQ_gee				-0.00685***	-0.00289	0.00138
				(0.00201)	(0.00352)	(0.00148)
trade_open_gee				0.179***	0.190***	-0.00886
				(0.0266)	(0.0311)	(0.0234)
fin_open_gee				-0.00141**	-0.00175***	0.00453***
				(0.000584)	(0.000478)	(0.00162)
Observations	192	112	80	192	112	80
R-squared	0.417	0.711	0.831	0.584	0.807	0.846
Number of cod	12	7	5	12	7	5
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
estat	0.347	13.23	0.514	0.136	13.30	0.00188
estatp	0.556	0.000275	0.473	0.712	0.000266	0.965
idstat	64.59	37.83	32.40	60.98	37.59	31.22
idp	1.80e-07	0.00259	0.0134	7.22e-07	0.00279	0.0188

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 2 and 3 present the estimates results for the whole EMU sample and for the EMU members divided in core and periphery groups in the period 1996-2015. In columns 4-6, there are the estimates of the baseline equation augmented with interaction terms between taxes and social security contributions, trade and financial openness and institutional quality.

With the inclusion of these terms the estimated parameters indicate how the coefficient of the original regressor changes as the interacted variable increases (or is 1 in the case of the euro dummy). Notably, the baseline model estimates proved to be robust to the inclusion of institutional quality and euro dummy interactions confirming the robustness of the baseline model. More in details the estimates show that a higher government effectiveness reinforced, as expected, the reducing impact of taxes and transfers on inequality for the whole EMU sample while it had no significant impact on core and periphery groups separately.

As for trade openness the presence of higher government effectiveness increases inequality in the full sample and in core countries while it is not statistically significant for peripheral

countries. One possible explanation is that in core countries governments implemented effectively policies that favored efficiency over equity. In any case, our model is admittedly too simplified to draw robust conclusions and this issue need a further and deeper investigation.

Table 3 Estimates results: inequality and European integration 1996-2015

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	tot	core	peri	tot	core	peri
dy	-0.0401	-0.268***	0.124***	-0.0640	-0.273***	0.137***
	(0.0910)	(0.0946)	(0.0368)	(0.0896)	(0.0899)	(0.0380)
UNR	0.00284***	0.00460***	0.00459***	0.00332***	0.00530***	0.00455***
	(0.000736)	(0.00158)	(0.000298)	(0.000749)	(0.00136)	(0.000311)
TAXQ	-0.00148	0.000417	-0.00186**	-0.00479***	0.0106***	-0.00247**
	(0.00191)	(0.00197)	(0.000775)	(0.00177)	(0.00291)	(0.000979)
LGDPV_PC	0.179**	0.536***	0.0238	0.231***	0.586***	0.0103
	(0.0730)	(0.0849)	(0.0200)	(0.0724)	(0.0742)	(0.0223)
trade_open	0.0469***	-0.00392	-0.0289***	0.0557*	0.0484*	-0.112***
	(0.0155)	(0.0170)	(0.00840)	(0.0338)	(0.0261)	(0.0365)
fin_open	-0.000505**	-0.000160	-0.00245***	-0.000737	-0.000260	0.00983*
	(0.000244)	(0.000173)	(0.000432)	(0.000767)	(0.000550)	(0.00516)
euro	-0.00361	-0.0154	-0.00692**	-0.163***	0.430***	-0.0499
	(0.0126)	(0.0136)	(0.00292)	(0.0563)	(0.0898)	(0.0421)
TAXQ_euro				0.00415***	-0.00962***	0.000380
				(0.00127)	(0.00200)	(0.000878)
trade_open_euro				-0.0188	-0.0630***	0.0896**
				(0.0285)	(0.0213)	(0.0361)
fin_open_euro				0.000341	0.000263	-0.0126**
				(0.000614)	(0.000464)	(0.00516)
Observations	228	133	95	228	133	95
R-squared	0.402	0.711	0.834	0.435	0.770	0.842
Number of cod	12	7	5	12	7	5
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
estat	0.0987	5.116	0.0836	0.0690	7.497	0.200
estatp	0.753	0.0237	0.772	0.793	0.00618	0.655
idstat	63.44	38.28	36.14	62.24	37.31	33.55
idp	2.06e-06	0.00546	0.0148	3.19e-06	0.00725	0.0293

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

As for financial integration the interaction term with government effectiveness is negative and significant in the full sample and the core countries (showing a negative/reducing relationship with inequality) and positive and significant in periphery. The empirical findings confirms the reduction of inequality with the financial development in the entire group of EMU-12.

The impact was not always significant, neither was it robust when running the estimates for the two subgroups of countries. These results are consistent with existing evidence on developed and developing countries which supports the view of opposing impacts of financial globalization and the dependence on institutional, financial and other country-, time-, and case-specific characteristics (Goldberg- Koujianou and Pavcnik, 2007; Kose et al., 2006).

If we look at the impact of the euro introduction in the baseline equation we notice that the participation to EMU decreased inequality only in periphery countries. Milio (2012) suggests

that the negative sign of the coefficient might be caused by the fact that the variable captures the effect of the Structural and Cohesion Funds on inequality. If we look at the equation specification including the interaction terms the results indicate that the more integrated the core Eurozone countries become, the more unequal they are. As for taxes and transfers being members of EMU and core countries make fiscal policies more effective in reducing inequality and the same occurs for what concerns trade integration.

Differently being an EMU member and a peripheral countries make trade integration increasing inequality and financial integration decreasing it. As for the impact on trade the result seems counterintuitive, as one may think that the more the countries trade with each other, the more economic wealth they create, decreasing unemployment and income inequality. One potential explanation for this outcome was proposed by De Grauwe (2013), who argues that the degree of trade specialization has increased in the past twenty five years in the EU countries making EMU countries prone to asymmetric shocks with negative impact on income distribution.

Conclusions

This paper analyses some drivers of income inequality in EMU countries over the period 1980-2015 with a focus on the role played by the European integration process. To this end we considered a panel of 12 EMU members. The results show that, in the period under observation, the main contribution to income inequality, measured through the post tax Gini index, stems from per capita GDP growth and trade openness. The estimates also show, in line with the relevant literature, that there are other factors influencing inequality in EMU, including unemployment rate, spending on social policies and institutional quality.

The empirical evidence suggests that the effects of the European integration process, captured by trade and financial openness indicators, on income inequality was heterogeneous across country groups. Moreover, once disentangling the country sample in core and periphery groups, as identified by the relevant literature, estimate results seem to support the hypothesis of a core periphery dualism also for what concerns inequality trends within the EMU.

In fact, GDP growth had not significant impact on EMU group inequality in the period observed, on the contrary its effect on core and periphery countries separately was heterogeneous. An increase in per capita income growth is negatively correlated to inequality in core countries while positively in peripheral ones. These results hold also restricting the analysis to the post EMU period (1999-2015). Trade openness is positively associated to income inequality in the EMU countries as a whole. Looking at core and periphery countries the trade coefficient is not statistically significant in core countries while is negative for the periphery group suggesting that trade integration is negatively correlated to inequality only in peripheral countries. Restricting the analysis to the post EMU period we found that the coefficient is negative (inequality reduction) and statistically significant also in core countries possibly because the intensification of trade linkages.

Financial openness is negatively associated to inequality in EMU as a whole although the magnitude of the coefficient is very small. Disentangling the analysis for core and peripheral groups we found that the coefficient is not statistically significant for core group while is negative in the peripheral one. In any case, our model is admittedly too simplified to draw robust conclusions and this issue

need a further and deeper investigation especially because of the presence in the peripheral group of outliers.

The unemployment rate, as expected, is found to be positively related to inequality in both core and periphery groups but the coefficient had a greater magnitude for peripheral countries. On the contrary, taxes and social security contributions are negatively associated with inequality but only in peripheral countries. Estimates also showed that Government effectiveness is positively related to inequality after 1998 in EMU countries. One possible explanation of this counterintuitive result is that after the introduction of the euro in EMU countries governments implemented effectively policies that favored efficiency over equity probably in order to meet the Treaties requirements (i.e. austerity measures reduced the resources for redistributive policies). Eventually if we interact the dummy EMU with the main regressors, trade integration and taxes and transfers income inequality reduction seems to be higher in core countries than in periphery while the opposite occurs for what concerns financial integration.

Our results suggest that given the different impact of selected explanatory variables on income inequality in core and periphery groups, the implementation of "one size fits all" policies might be ineffective and even counterproductive to reduce inequality in EMU. A more comprehensive, targeted and coordinated set of domestic and European policies, including structural reforms that enhance institutional quality, might be more appropriate to reduce income disparities.

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Appendix

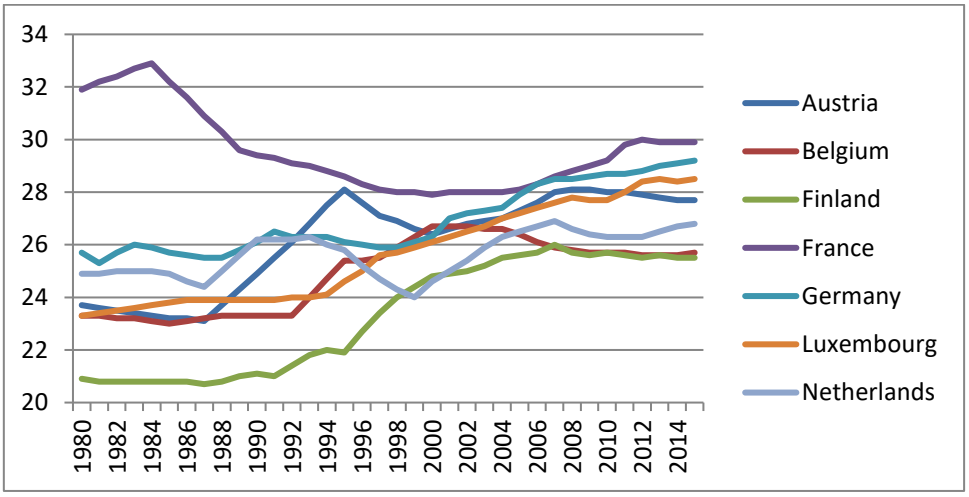
Table A1: Data description

Trade openness	*(Exports +Imports)/GDPt-1*	*Source: OECD*
GDP per capita		*Source: OECD and IMF*
Financial openness	*Net foreign assets+ liabilities (NFA+NFL)/GDPt-1.*	*Source: EWNII Milesi Ferretti (2017)*
Goverment effectiveness	*Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The index is based on over 30 individual data sources produced by a variety of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms. Estimate of governance ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance. For a full methodological explanation see Kaufmann, Kraay and Mastruzzi (2010).*	*Source: World Bank WGI*
Public expenditure		*Source: OECD*
Gini index	*Income after taxes and benefits*	*Source: Standardized World Income Inequality Database, Solt (2016)*
unr	*Unemployment rate*	*Source: OECD and IMF*
taxq	*Taxes and social benefits*	*Source: OECD and IMF*

Tab A2 Descriptive statistics

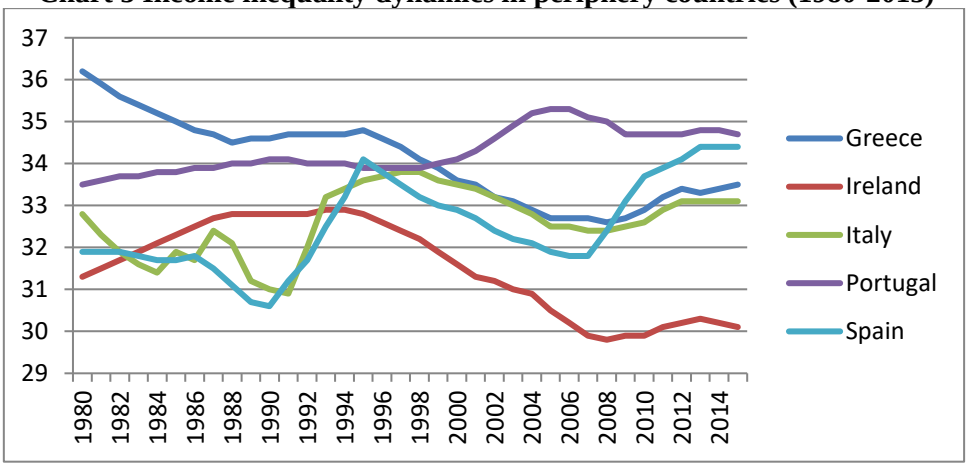
Variable	Obs	Mean	Std. Dev.	Min	Max
gini_disp	1,262	28.51472	4.376898	16.49636	38.80524
TAXQ	774	37.31991	6.515154	23.47283	50.42081
UNR	843	7.821788	4.130745	1.034347	27.48579
gee	540	1.204918	.6222507	-.5690975	2.353998
trade_open	867	.848813	.8213001	.0010496	5.069949
fin_open	602	11.5264	39.83376	.282079	370.8804
GDPVD_CAP	834	33801.7	13304.27	7984.003	91925.37

Chart 4 Income inequality dynamics in core countries (1980-2015)



Source: World Bank, Solt (2016)

Chart 5 Income inequality dynamics in periphery countries (1980-2015)



Source: World Bank, Solt (2016)