Growth divergence and income inequality in OECD countries: the role of trade and financial openness.

E. D'Elia and R. De Santis[*]

Abstract

This paper analyzes trade and financial openness effects on growth and income inequality in 35 OECD countries. Our model takes into account both short run and long run effects of factors explaining income divergence . We estimate, for 1995-2016, an error correction model. Evidences suggest that trade and financial openness reduce growth gaps but not income inequality, and effects of finance are stronger in high income countries. Low and middle income countries benefit more from international trade. Our contribution to existing literature is threefold: i) we study short and long run effects, ii) we focus on developed countries (OECD), iii) we provide a sensitivity analysis including an institutional indicator, a trade agreement proxy and a dummy of global financial crisis. Estimates results indicate that trade openness significantly improved the conditions of OECD low income countries both in short and long run mostly, consistently with the catching up theory.

Keywords: Trade openness, Income inequality, Panel data analysis

JEL Classification: D63, D31, 015, H23

[*]enrico.delia@dt.tesoro.it; rdesantis@istat.it (corresponding author) Istat-MEF Istat, Via Balbo 4 00185, Rome Italy and Treasury Dep. MEF, Via XX Settembre, 96, Rome Italy.The views expressed in this paper are those of the authors and do not necessarily represent the institutions with which they are affiliated. A preliminary version of this paper was presented at the XXX Villa Mondragone international Economic Seminar 2018. Thanks are due to an anonymous referee for many useful suggestions. Any errors or mistakes remain the authors' sole responsibility. Thanks are due to an anonymous referee for many helpful suggestions.

Introduction

The impact of trade and financial openness on income level and distribution is at the center of the current international economic policy debate also at OECD level. Trade and financial integration have been an engine for growth in many countries by enhancing efficiency and widening the market for national products. Nevertheless, increasing trade and financial flows between countries, in conjunction with technological progresses, are often cited as worsening income inequality and growth rates disparity. In this regard, opinions oppose between economists who argue that free trade and capital movements are the key to economic growth being associated to more efficient use of resources and eventually reduces inequalities and others arguing that the openness might itself be a factor of inequality, at least in the short run, fostering the progress of few high competitive firms and sectors and the remuneration only of most demanded jobs.

The present study analyses the effects of trade and financial integration on growth and income inequality in OECD countries, where most factors explaining the divergence in emerging countries such as technology, demography and education, have arguably a relatively minor effect. It also takes into account that trade and financial openness might have different, and possibly opposite, outcomes in the short and in the long run and across countries, thus determining both winners and losers.

The relationship between trade openness and income disparities is intensively debated in theoretical and empirical economic literature. The standard trade theory, the Heckscher-Ohlin model (H-O), predicts that countries should experience after converging equal trends because of globalization. The Stolper-Samuelson theorem, one of the most important corollaries of the H-O model, states that openness would benefit a country's relatively abundant factor, since trade specialization will favor sectors intensive in the abundant factor. However, if the basic framework of the model is extended for example to account for multiple skill-related categories of workers (Wood, 1994), different country groups (Davis, 1996) and traded goods (Feenstra and Hanson, 2003), the main distributive prediction of the theorem are theoretically undetermined and depends on the relative weights and directions of trade flows[1.] In addition, the impact of financial integration on economic growth and distribution is broadly analysed in literature (see Naceur and Zhang 2016 for a survey) however, the studies on the relationship between financial development and income distribution are still blossoming. Theories on the effect of financial integration on income distribution are still inconclusive: one strand of the literature proposes an inverted-U relationship between finance and income inequality, while the other predicts a linear relationship.

Our contribution to the existing empirical literature is threefold: i) we use an error correction model (ECM) applied to panel data to investigate the trade and financial integration's impact on levels and distribution of income in the main OECD countries in short and long run. Consistently with the findings of the descriptive analysis, we provide separate estimates for the whole OECD sample and for the countries divided in the three GDP per capita groups (low, middle and high income); ii) we focus on OECD countries that share in the period under observation relatively similar

[1] Furthermore, if the model assumption of homogeneous production functions among countries is relaxed, then international openness may facilitate technology diffusion from High Income Countries to Low and Middle Income ones, and it is very likely that the new technologies are more skill intensive in relation to those in use domestically before trade liberalization. If such is the case, then openness – via technology – might determine a counter-effect to the theorem prediction, (i.e. an increase in the demand for skilled labor, an increase in wage dispersion and in income inequality (Lee and Vivarelli, 2006).

technologies and human capital levels especially when disentangled for homogeneous income levels groups and iii) we provide a sensitivity analysis introducing in the estimates a dummy for the global financial crisis, an institutional indicator, a trade agreements proxy and interacting the trade openness with the two latter regressors. Furthermore, the empirical evidence provided by this paper might have interesting policy implication in the current situation characterized by retreat from globalization and rising protectionism especially in advanced economies.

The paper is organized as follows. Section 2 present a brief survey of literature, section 3 reports the main stylized facts on trade openness and income distribution in the OECD countries. Section 4 describes equations, dataset and empirical strategy. Section 5 presents the econometric results, while section 6 reports robustness checks. Conclusions and policy implications follow.

2. Trade and financial openess, income levels and inequality: A survey of literature

As for the role of trade openness on growth and inequality in advanced countries this paper draws specifically on two different though related strands of empirical research. The first strand examines the impact of international trade on between countries income convergence and starts from the Frankel and Romer (1999) seminal paper. Many empirical studies supporting or opposing trade openness drew their results from cross sectional data and were subject to an important criticism in terms of estimates robustness.

In particular, Edwards (1998) and Rodriguez and Rodrik (2000) argue that the strong results in favor of openness may arise from mis-specified models and/or openness measures may be acting as a proxy for other macroeconomic policies or other important omitted factors such as institutions and geography. The literature results are still inconclusive. In fact, criticisms of free trade and the current debate suggest that international trade only between heterogeneous countries triggers income disparity. On the other side of the debate, some authors suggest that free trade might reduce income inequality across countries[2].

The effects of trade on incomes in the advanced countries have been much studied, beginning with a number of works on wage distributions in the 1990s, to more recent papers on the effects of globalisation on the labour share (Elsby et al. 2013), wage inequality (Ebenstein et al. 2015), and routine middle class jobs (Autor et al. 2014). More specifically in advanced economies, the ability of firms to adopt labor saving technologies and offshoring has been cited as an important driver of the decline in manufacturing and rising skill premium (Feenstra and Hanson 2003). However, Quah (1996) argued that income convergence, if any, occurs within different "clubs" of countries, rather than across all the economies at the same time.

The second strand of research analyses the impact of international trade on within income inequality. Lakner and Milanovic (2016) popularised the "elephant graph" representing income dynamics between 1988 and 2008. It shows that very poor households, belonging to the first decile of income distribution, benefitted only to a minor extent from overall growth. Income growth rate increased until the median income earners drawing the back of the elephant in the graph; the growth

[2] Bourguignon and Morrisson (2002), in their studies of historical trends in globalization and inequality, conclude that globalization was a driving force for between-country convergence since the 19th century. However, Dowrick and Golley (2004) reveal that while trade openness promoted convergence in the 1960s and 1970s, since 1980 the benefits of trade are mostly attributed to the richer economies, with modest benefits to the less developed economies. Sala-i-Martin et al. (2004) finds that overall global inequality has been falling since 1980, due to between-country convergence.

rate fell close to 0 for the households in from the 7th to the 9th decile of income distribution and picked up for the richest households, resembling the elephant's trunk.

Many papers provide evidence of a positive relationship between trade openness and inequality in developed countries[3]. They obtain different estimates of the reactivity of inequality to trade and financial openness, depending on the estimation sample, the statistical techniques adopted and the control variables included in the models. Lim and McNelis (2016) use a panel of annual data from 1992 for about 40 countries below the average world's per capita GDP and find an elasticity of the Gini index about 0.05, albeit it about doubles for low-income countries and turns to negative for upper-middle countries.

Bumann and Lensink (2016) report an average elasticity of the same inequality index to financial openness, measured by the Chinn and Ito (2008) index, close to 2, considering 106 countries over the time period 1973 to 2008 and controlling for inflation, trade openness, financial depth, per capita GDP, education and demographic indicators. They also adopt a GMM estimator to treat the possible endogeneity of some explanatory variables and conclude that financial liberalization improves income distribution in countries where financial depth is higher.

Dabla-Norris et al. (2015) study about 100 countries, including the most advanced economies, during the period 1980–2012, and estimate an elasticity of Gini index that is negligible to trade openness and is 0.05 respect to financial openness. Their reference model that builds on) includes among the control variables also: education, financial depth and some indicators on the structure of population and labour market, other than public expenditure. Roser and Cuaresma (2016) estimate a model on a panel of 32 developed countries over the last four decades by using GMM and find an elasticity of Gini index to trade openness about 0.01, controlling for public expenditure, GDP growth, per capita GDP and international trade structure.

In addition, the literature on the impact of financial integration, on growth and inequality provide heterogeneous results. Greenwood and Jovanovic (1990) predict a nonlinear relationship between finance and inequality underlining that distributional effect of financial inetrgartion depends on the level of economic development[4]. They suggest that financial deepening eases credit constraints, which benefits low-income groups through the channels of human capital and capital accumulation. Although theory provides conflicting conclusions on the finance-inequality relationship, empirical works suggest that financial integration contributes to increase income and reduce inequality. Cross-country evidence from Beck et al (2007) and Rajan and Zingales (2003) for example suggests that expanding private credit can stimulate income growth for the poorest quintiles and reduce income inequality.

Papers that are more recent attempted to include other dimensions of financial development. For example, Jeanneney and Kpodar (2011) establish that financial instability worsens poverty and Kunieda and others (2011) find that financial integration aggravates income inequality by benefiting the most privileged. Similarly, Furceri and Loungani (2015) study the impact of capital

[3] For instance, Helpman et al. (2012) and Akerman et al. (2013) analyse the role of trade in increasing intra-sector wage disparity in a number of developed and developing countries.

[4] At early stages of development, only the rich can access financial services because of the fixed cost of joining the financial coalition, resulting in wider income inequality. As the economy develops, the financial system becomes more accessible and affordable to the poor because human capital replaces physical capital as the main driver of growth.

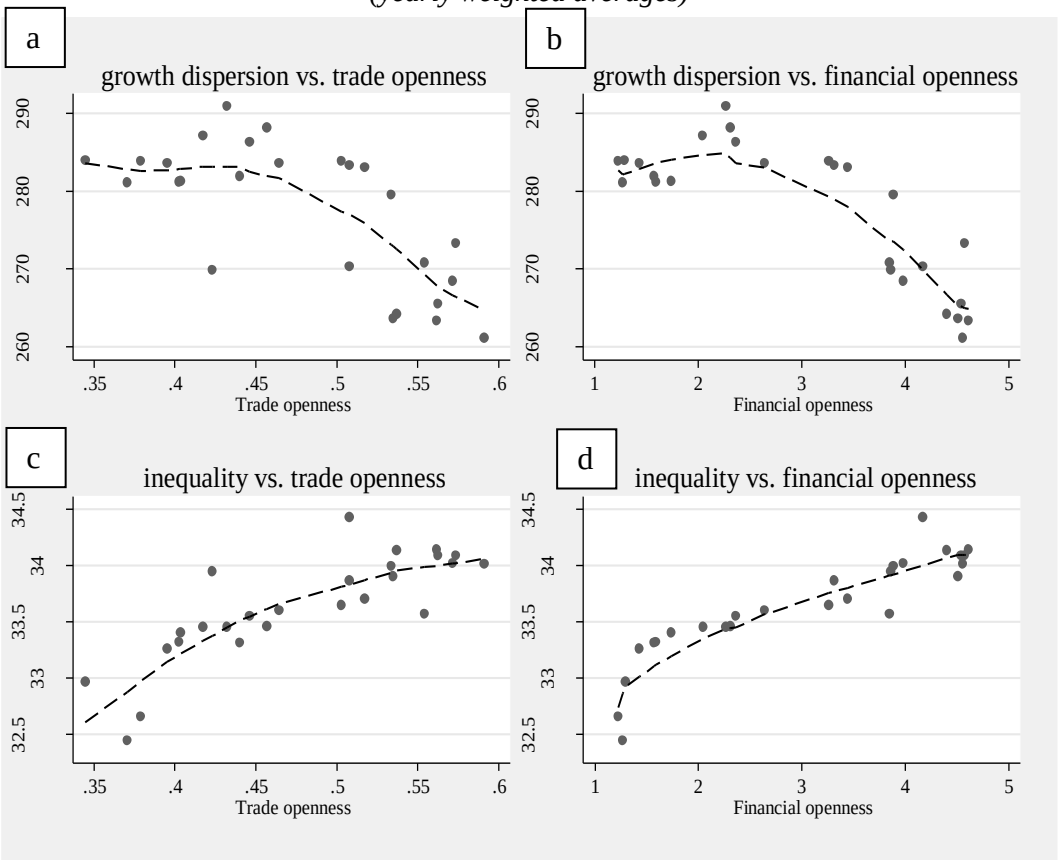
account openness on inequality and find that liberalizing domestic financial systems can aggravate income inequality, both in the short and medium run.

3. Some stylized facts on trade and financial openness, growth and income inequality in OECD countries

All in all in the OECD trade and finance integration seem to have contributed to reduce the gaps of per-capita incomes across the countries over time, as shown in panels a and b of chart 1, albeit the relationship between income dispersion and openness is strongly non- linear. Indeed, openness tends to widen or to keep almost constant income disparities before a given threshold, and to reduce it afterward.

Chart 1 – Trade and financial openness, growth and income inequality in OECD countries*

(yearly weighted averages)



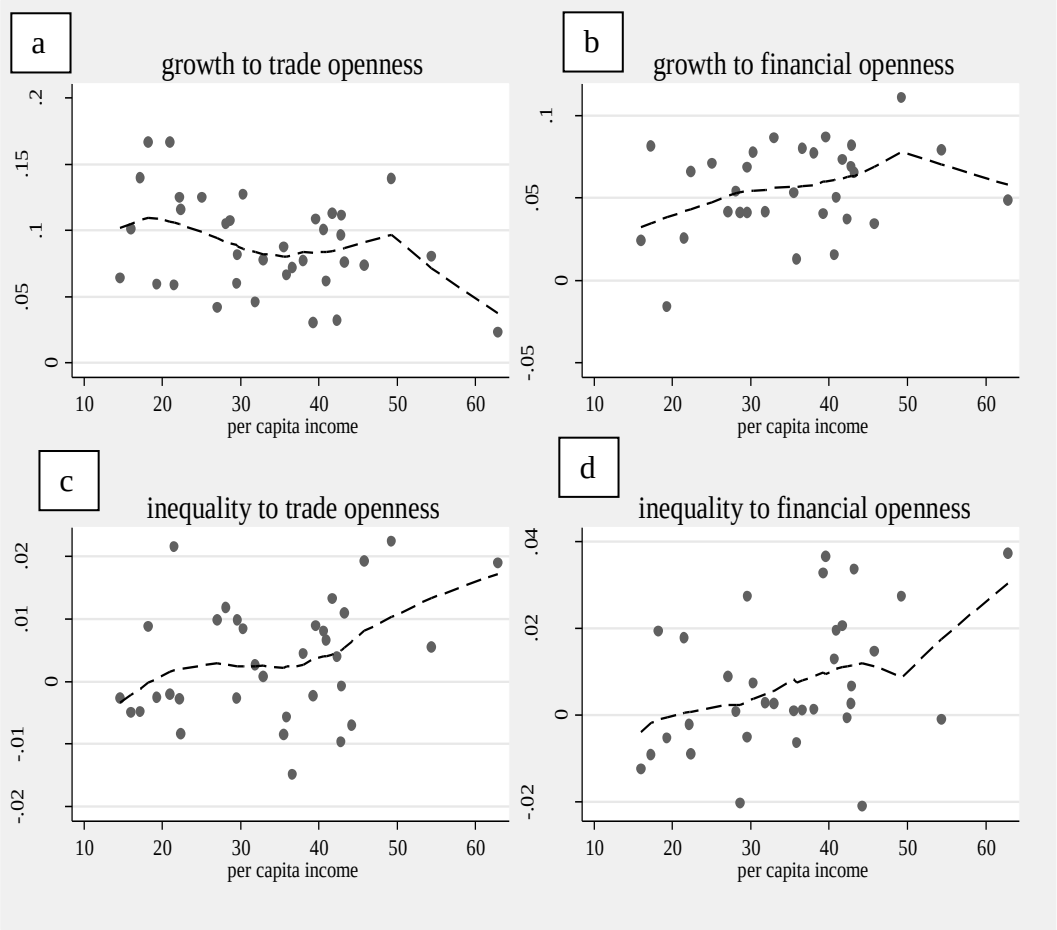
**Interpolating dashed lines are locally weighted scatterplot smoothing (LOWESS) estimates.*

On its turn, income inequality within each country seems to increase as the globalization proceeds, as panel c and d of chart 1 suggest. Estimating the unconditional elasticity of per capita income and inequality to trade and financial openness in each country provides some further insight on the effects of globalization. For each OECD member the regression $\ln(y_t) - \ln(y_{t-1}) = \eta_{yx}(\ln(x_t) -$

ln(xt-1)) was estimated, where y was in turn per capita GDP in volume in US$ and the Gini index[5] computed on disposable income, and x was one of the openness indicators. The main results are summarized in chart 2, where the estimated elasticities are plotted against per capita GDP levels.

Although data variability is large, chart 2 suggests that the relationships between globalization indicators (i.e.: trade and financial openness) and income vary with national development level. For instance, panel a of chart 2 shows that the growth rate of low income countries is related to trade integration more than in high income countries. Contrarily, the elasticity of growth to financial openness, reported in panel b, seems to be higher in the richest OECD members. When international trade intensifies, income inequality the Gini index is lower mostly in low and middle-income countries (panel c of chart 2).

Chart 2 - Elasticity of per capita income and inequality*
(country averages)



**Interpolating dashed lines are locally weighted scatterplot smoothing (LOWESS) estimates.*

5 The benchmark for the Gini index is the equidistribution of income among the individuals that could differ from the social preferences about income inequality.

In any case, the evidence reported in chart 2 suggests that the relationships among the relevant variables are non-linear and are likely influenced by country-specific factors. Thus, in the empirical analysis that follows we ranked the OECD countries according to their increasing per capita GDP level and then created three groups each including one third of countries, henceforth named "low", "middle" and "high" income OECD countries[6].

4. Equation, dataset and methodology

Differently from the most of the empirical literature on this issue, our model specification takes into account both the short run effects of per capita income and inequality explaining factors, that arguably might be relatively small and temporary, and their long run impacts. Separate the short and long run impact might have important policy implications because it helps in evidencing factors that might be permanent driving forces for fostering growth and/or reducing inequality (thus have to be targeted by the policies) from those that are just temporary.

We thus estimate an ECM, in which the dynamics of growth and income inequality are driven by short run elasticity with respect to some selected influencing factors and by the deviation from a long run relationship. Pesaran *et al.* (1995) and Westerlund (2007) analyse the estimation of ECM using panel data.

The linear formulation of the model is:

$$\Delta y_{it} = \sum_j \alpha_j \Delta x_{jit} - \beta_0(y_{it-1} - \sum_j \beta_j x_{jit-1}) + \delta_i + \theta_t + u_{it} \qquad [1]$$

where the change between the periods of time *t-1* and *t* of the endogenous variable *y* measured on the *i-th* individual of the panel is explained by the changes of a number of explanatory variables x_j whose short run impact on Δy_{it} is measured by the parameters α_j; the past deviation of y_i from the long run relationship $\sum_j \beta_j x_{jit-1}$; a set of country dummies δ_i representing time invariant country specific omitted variables, and time dummies θ_t representing common time-varying factors not included in the model; the idiosyncratic term u_{it}. The convergence speed to the long run relationship (not necessarily an equilibrium condition) is measured by the *positive* parameter β_0.[7] A generalization of [1] includes a set of long run relationships, corresponding to possible multiple cointegration relationships between the variables *y* and x_j.

The formulation [1] holds both for stationary and non-stationary time series, but in the latter case the long run relationship exists, i.e.: β_0 is not null, only if *y* and x_j are cointegrated. Assuming that no explanatory variable is endogenous, the model [1] can be estimated consistently by running a standard fixed effects GLS, as shown by Westerlund (2007. Alternatively, a two-step procedure can be adopted; similar to the one originally proposed by Engle and Granger (1987) for time series data. In the first step the static long run relationship

[6] Low per capita income countries includes Brazil, Chile, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Mexico, Poland, Portugal, Slovak Republic and Turkey. Middle per capita income countries includes Finland, France, Greece, Iceland, Israel, Italy, Japan, Korea, New Zealand, Slovenia, Spain and United Kingdom. High per capita income countries includes Australia, Austria, Belgium, Canada, Denmark, Germany, Ireland, Luxembourg, Netherlands, Norway, Sweden, Switzerland and United States.

[7] A negative value of β_0 would signal a permanent divergence from the supposed long run relationship that casts doubts on the existence of the latter "attractor" itself.

$$y_{it} = \sum_j \beta_j x_{jit} + \delta_i + \theta_t + v_{it} \quad [2]$$

is estimated by using GLS, since cointegration of non-stationary variables grants the "super-consistency" of estimates (but not of corresponding standard errors), as shown by Stock (1987).

We test our model for the period 1995-2016 for 35 OECD countries. Consistently with the descriptive analysis, we disentangle our regressions in three groups (low, middle high) according to countries' level of GDP per capita.

The aforementioned literature suggests that a reliable model explaining income inequality between and within countries should include explaining variables, in addition to per-capita income starting level and trade and financial openness. For instance, the level of human capital, the structure of foreign exchanges, industrial structure, fiscal policy, foreign direct investments and market liberalization should be considered.
Nevertheless, this study focuses on the OECD countries and on the last few decades, during which income inequality within each country apparently kept rising again after the "great levelling" of the middle part of the past century. Most candidate explaining variables display relatively low variability along the time and across countries. Thus, we assume that their influence might be captured by a combination of country dummies, that implicitly take into account permanent differences in human capital, sectorial specialization, business environment, etc., and time dummy, that ideally account for the effect of common shocks and a common evolution of omitted (and unobservable) variables.

Relying on previous literature, we include in the regressions explaining national per capita GDP in volume (*GDP_pck*) and income inequality (*ineq*)[8] the following common set of variables, all transformed in logarithms: i) a trade openness indicator (*trade_open*); ii) a *de facto* measure of financial openness index (*fin_open*) given by the sum of financial assets plus liabilities divided by the GDP of the previous period; iii) the terms of trade (*terms_trade*); iv) the value added per employed person with tertiary education (*lp_a*) as a proxy of the contribution to growth of human capital; v) the public expenditure divided by previous year GDP *(pe_GDP*) and vi) interests on public debt divided by previous year GDP (*int_GDP*). In addition, the labour share (*LS*) has been included in the inequality equation.

The key variables for our analysis are *trade_open* and *fin_open*. A commonly used measure in the analyses of the relationship between trade and growth is total trade volume (of both goods and services) as a share of total GDP (*trade_open*). The trade-to-GDP ratio is often referred to as the "trade openness ratio". 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. Tables with the description, data sources and descriptive statistics of the variables are provided in the appendix. As for the financial openness indicator, we selected a de facto indicator. We preferred it to the *de iure* Chin Ito index because the latter has a very low variability after 1995 across OECD members and available data end in 2011.[9.]

[8] In our model we use the post tax Gini index since it has a wider coverage and comparability in terms of years and countries than other, possibly more accurate, inequality measures.
[9] All those measures might be imperfect. 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. Thus, whatever measure of actual financial integration is chosen, it risks containing incomplete and thus distorting information on the process. On the other hand, the de jure

5. Estimates results

The ECM model [1] was estimated using GLS mainly to assess the relevance of trade and financial openness in explaining the disparities of per capita GDP growth across OECD countries and their effect on income inequality, measured by the Gini coefficient, within the same countries. As we have already underlined the ECM model allows distinguishing between the short and long run effects of the aforementioned regressors.

Table 1 presents the estimates results for the whole OECD sample and for the countries divided in the three GDP per capita groups (low, middle and high income) consistently with the descriptive analysis. In the second column, there are the estimates of the baseline equation augmented with interaction terms between trade openness financial openness and GDP per capita.

The estimates show, with no exception, that in the short run trade openness in the period 1995-2016 had a positive impact on growth although the coefficients present different magnitudes being the greatest for low income countries.

The interaction terms in the second column suggest that the level of lagged per capita GDP exerts a negative impact on the elasticity of growth to trade both in the short and long run (-0.12 and -0.09 respectively). This result confirm the graphical evidence presented in Chart 2, where the OECD countries with high income level apparently benefited less from trade integration. The opposite occurs for what concern financial integration. Therefore, the interaction coefficient has a positive and significant value both in short and long run (0.05 and 0.02 respectively). It follows that richest countries benefit more from open financial markets, possibly compensating the relative loss on the market of goods and services.

Thus, trade seems to improve mostly the conditions of OECD low income countries, consistently with the neoclassical catching up theory stating that countries with lower income levels grow faster in order to converge to the income of more advanced countries. The OECD middle income group tends to react less to the trade openness than the two other groups this determines the fact that its income convergence is weaker than in the other two groups. This result is in line with the evidence provided by the descriptive paragraph and with the decrease of the overall income inequality between countries pointed out by the literature on trade globalization advantages. This result suggests that middle income countries tend to lose positions in the global value chain, possibly because of the increasing competition with low-income economies and outsourcing processes, as argued also by Cattaneo, Gereffi and Staritz (2010) and Eichengreen, Park and Shin (2013), who conjecture a "middle income trap", since these countries are no longer competitive in standardized, labor-intensive commodities, but their productivity is too low to are also to compete in higher value added industries.

Notably, trade intensification had a positive effect on growth also in the long run, particularly for the middle group, suggesting that their shortfall in the short run might be temporary. It is worth to underline however that this analysis do not catch possible adverse permanent outcomes due to the

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.

hysteresis effect of short term relative losses. The financial openness had a positive and significant impact only in the short run on middle income countries being not statistically significant for the other two groups.

This fact on the one side might ease the weaker convergence of middle income economies, but on the other side strengthens the position only of countries that are more active on the financial market, accentuating the relative loss of the others. In any case, in the long run, financial openness had only a negligible permanent effect on growth, suggesting that capital markets can sustain national growth but do not represent a permanent driving factor.

The terms of trade exert heterogeneous impacts on the three groups and over time. In the short run they have a negative impact on the OECD group as a whole, likely because their negative effect on price competition against the rest of the world.

Particularly, the growth of middle income countries seems to be negatively affected by a raise of the relative prices of national product, confirming the difficult competitive position of those countries. However, in the long run gaining terms of trade seems to have fostered the growth in the OECD countries as a whole, possibly because the positive effect of market power and quality of goods prevail. Expectedly, this effect is significant in less developed countries but not within each group of OECD countries, thus it contributes to make the growth of advanced economies converge toward a common trend.

Public expenditure had a negative impact on per capita income growth. In the short run low income OECD members are particularly impaired by the weight of the government on the economy, while in the long run public consumption and investment seem to crowd out private expenditure especially in middle and high income countries.

Apparently, interest paid on public debt hampered the overall growth of OECD members in the short run, but not within each of the three groups of countries, possibly because this payment ultimately redistribute income within the countries belonging to same club. In the long run, high income countries seem even take advantage of this special item of the public expenditure, possibly because it raises national disposable income of households and corporations.

The return on education, approximated here by the value added per employed person with tertiary education, had a positive impact on per capita income on the whole sample and on high income countries both in the long and short run, and on middle income countries just in the long run. A possible reason is that the tertiary education produces an high return where there are suitable "infrastructures" to make it profitable.

Table 1 Estimates results: trade and financial integration and growth

	OECD		low income	middle income	high income
		Short run effects			
D.trade_open	0.0888***	1.352***	0.266***	0.0664***	0.0797***
	(0.0137)	(0.265)	(0.0729)	(0.0209)	(0.0216)
D.fin_open	0.0141*	-0.534***	-0.0204	0.0182**	-0.00534
	(0.00764)	(0.177)	(0.0524)	(0.009219	(0.0131)
D.terms_trade	-0.0551*	-0.0335	0.0163	-0.104**	-0.0404
	(0.0297)	(0.0306)	(0.2659)	(0.0486)	(0.0386)
D.ppe_GDP	-0.153***	-0.232***	-0.229**	-0.137***	-0.163***
	(0.0191)	(0.0209)	(0.08829)	(0.0341)	(0.0218)
D.int_GDP	-0.00637**	-0.00740**	-0.0223	-0.00301	-0.00363
	(0.0028)	(0.00295)	(0.0151)	(0.00395)	(0.00445)
D.lp_a	0.0273**	-0.0110	-0.0313	0.0203	0.0331**
	(0.0108)	(0.0102)	(0.0492)	(0.0184)	(0.0148)
D.trade_gdp		-0.121***			
		(0.0254)			
D.fin_gdp		0.0515***			
		(0.0169)			
		Long run effects			
L.GDP_pck	-0.0897***	-0.120***	-0.102*	-0.0599***	-0.0959***
	(0.013)	(0.0133)	(0.0596)	(0.0225)	(0.0249)
L.trade_open	0.0689***	0.970***	0.258***	0.0820***	0.0239*
	(0.00952)	(0.198)	(0.0621)	(0.0172)	(0.014)
L.fin_open	0.00394	-0.208***	0.0375	0.00251	-0.00169
	(0.00421)	(0.0778)	(0.0415)	(0.00588)	(0.00652)
L.terms_trade	0.0288**	0.0231*	-0.0897	0.0352	0.0157
	(0.0119)	(0.0135)	(0.277)	(0.0228)	(0.0139)
L.ppe_GDP	-0.0941***	-0.129***	-0.182	-0.125***	-0.0974***
	(0.0138)	(0.0151)	(0.109)	(0.0229)	(0.0178)
L.int_GDP	0.00224	0.00325*	-0.0159	0.00288	0.00914***
	(0.00184)	(0.00184)	(0.0172)	(0.003)	(0.00266)
L.lp_a	0.0269***	0.0164***	-0.0394	0.0273***	0.0285***
	(0.0053)	(0.00481)	(0.0479)	(0.00776)	(0.00875)
L.trade_gdp		-0.0881***			
		(0.0190)			
L.fin_gdp		0.0199***			
		(0.00732)			
Constant	1.403***	1.817***	1.537	1.233***	1.475***
	(0.158)	(0.156)	(0.974)	(0.269)	(0.286)
Observations	513	495	65	222	226
R-squared	0.692	0.614	0.914	0.687	0.776
Number of cod	26	26	4	11	11
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 2 Estimates results: trade and financial integration and income inequality

	OECD		low income*	middle income	high income
		Short run effects			
D.trade_open	-0.0112	-0.396*	-0.0536***	-0.0426***	0.00515
	(0.00987)	(0.210)	(0.011)	(0.0138)	(0.015)
D.fin_open	0.0136**	0.0992	0.0207***	0.0151	0.0134
	(0.00685)	(0.143)	(0.00718)	(0.00967)	(0.0103)
D.ppe_GDP	-0.0207	-0.0140	0.00586	-0.0359	-0.00716
	(0.0141)	(0.0126)	(0.0185)	(0.026)	(0.0175)
D.int_GDP	0.00333*	0.00234	0.00372*	0.00703***	0.00229
	(0.00176)	(0.00153)	(0.00214)	(0.00213)	(0.00299)
D.lp_a	-0.00394	-0.00608	0.0172*	0.0316**	-0.0193*
	(0.0074)	(0.00574)	(0.00931)	(0.0124)	(0.0105)
D.LS	0.0344	0.0172		-0.142*	0.196**
	(0.0521)	(0.0438)		(0.0734)	(0.0759)
D.trade_gdp		0.0372*			
		(0.0199)			
D.fin_gdp		-0.00817			
		(0.0136)			
		Long term effects			
L.ineq	-0.108***	-0.122***	-0.0302	-0.0711**	-0.132***
	(0.0202)	(0.0191)	(0.0225)	(0.0307)	(0.03)
L.trade_open	-0.00503	-0.237*	-0.0263***	-0.0312***	0.00995
	(0.00628)	(0.133)	(0.00756)	(0.00818)	(0.00971)
L.fin_open	0.00840**	(0.0126)	-0.00863**	-0.0074	0.0118**
	(0.00335)	0.0900	(0.00345)	(0.0063)	(0.0046)
L.ppe_GDP	-0.0254**	-0.0137	0.0171	-0.0462**	-0.00889
	(0.0116)	(0.0105)	(0.0121)	(0.0207)	(0.0154)
L.int_GDP	0.00274**	0.00127	0.00478***	0.00747***	-0.00198
	(0.00129)	(0.00110)	(0.00164)	(0.00175)	(0.00202)
L.lp_a	0.00309	0.00360	-0.00215	-8.12E-05	-0.00506
	(0.00358)	(0.00297)	(0.00434)	(0.00499)	(0.00675)
L.LS	0.00222	0.000736		-0.0152	0.0557
	(0.0253)	(0.0239)		(0.0375)	(0.0389)
L.trade_gdp		0.0225*			
		(0.0126)			
L.fin_gdp		-0.00754			
		(0.00535)			
Constant	0.450***	0.460***	0.0192	0.458*	0.205
	(0.157)	(0.152)	(0.099)	(0.256)	(0.218)
Observations	368	353	209	135	212
R-squared	0.163	0.180	0.345	0.48	0.263
Number of cod	19	19	11	7	11
Country FE	YES	YES	YES	YES	YES
Year FE	YES		YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 * The coefficients of LS are not estimated for the first group of countries because too much data are missing for this variable.

Table 2 shows that trade openness has a negative relationship with the Gini index in low and middle income countries, both in the short and long run, but not in high income economies and not in the whole OECD sample. In this table we present an augmented version of the baseline equation including interaction terms between trade and financial openness and per capita GDP. The estimates results show that countries with higher per capita GDP benefited less from the equalising impact of trade integration both in short and long run (respectively by 0.04 and 0.02 per unit of income) while the effect of financial integration on inequality is almost insensitive to per capita GDP level.

Financial integration had negative impact on income disparities in the OECD sample with diverging effects among countries. The overall inequalising effect holds in both the short and long run and is likely related to the earnings of workers and entrepreneurs acting in the sector of financial services. However, it seems that in the long term the financial integration reduced inequality in low income countries but the magnitude of the coefficient is very small. In the short run, this outcome is stronger in low income countries, where the corresponding industry is less developed, although in the long term the gain tend to spread out to the other sectors, contributing to the equalization of incomes.

Differently, in the high income OECD members financial openness contributed to worsen income distribution in the long run, when being on the frontier of financial innovation grants a permanent advantage to the financial industry. Notably, the speed of convergence of the inequality to the corresponding long run relationship (i.e. the coefficient of $ineq_{t-1}$) is larger in high income countries, the inequalising long run impact of financial openness, that is the only statistically significant in the ECM component of the model, is dominating in this group of countries.

Among the control variables, public expenditure net of interest on public debt seems to contribute to reduce inequality significantly only in the long run, and particularly in middle income OECD members. On the contrary, the rent provided by the interest on public debt worsened income distribution, particularly in low and middle income countries.

The role played by tertiary education is mixed. The value added per skilled worker had a negligible effect on inequality in the OECD as a whole and in the long run. However, in the short run *lp_a* worsened income distribution in low and middle income countries, while improving it in the richest OECD members. A tentative explanation is that skilled workers and hi-tech enterprises, who gain more than the average, are relatively few in less advanced countries, and are abundant in richest countries. Thus increasing their share of value added had adverse effects on income inequality in the first two group of countries, but not in the third.

The effect of the labour share on income inequality is apparently negligible for the OECD as a whole, also because its variability along the time is limited and the differences across the countries are quite stable. Also *LS* is not available for most low income countries. It turns out that the country and time dummies in the model likely capture most of the effect of LS on inequality. Nevertheless, increasing the labour share had positive effects on inequality in the middle income countries, as expected, and positive in the high income OECD members, that is less explicable

In table 3 a summary of main estimates results is presented.

Table 3 Summary of main estimate results*

	short/long	Low income	Middle income	High income
Trade openess	growth	+/+	+/+	+/+
	inequality	-/-	-/-	+/+
Financial openess	growth	-/+	+/+	-/-
	inequality	+/-	+/-	+/+

*signs in red are not statistically significant. The first sign refers to the short run impact and the second one to the long term effect.

6. Robustness check: the role of institutional quality, trade agreements and global financial crisis.

In this paragraph we provide some robustness checks introducing in the original specification (see table 1 and 2) three additional regressors: i) an institutional variable on government effectiveness 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[10], ii) a euro dummy proxing trade integration among a group of countries within the OECD. We selected the EMU as the form of tightest trade agreement since the OECD members already constitute a very well integrated market and iii) a dummy proxing the global financial crisis occurred in 2008 extrapolated by the year dummies used as controls.

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 also tested the explanatory capacity of the expenditure in R&D as percentage of GDP but this regressor was not statistically significant, probably because investment in R&D has very long run returns that are captured by the few lags that can be practically introduced in our sample. We also included in our regressions interaction terms between trade openness and governments effectiveness and trade openness and the euro regressors.

The effect of trade agreements on income and growth is controversial. On the one hand, lowering trade barriers is likely to foster international trade by reducing transaction costs, which in turn can enhance economic growth rates of all participants. Likewise, it can be argued that economies that are more open to the rest of the world have more chances to take advantage of technologies developed elsewhere. On the other hand, it has been argued that some forms of protectionism can be beneficial for economic development in the long run to strengthen certain industries or sectors or a strategic trade policy in key sectors[11].

[10] The WGI comprises six governance indicators. Voice and Accountability, and Political Stability and Absence of Violence/ Terrorism relate to the process by which governments are selected, monitored and replaced. Government Effectiveness and Regulatory Quality refer to the capacity of a government to effectively formulate and implement sound policies. Rule of Law and Control of Corruption concern the respect of citizens and the State for the institutions that govern economic and social interactions among them. 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).

[11] The empirical literature on this issue is inconclusive especially for what concerns the advanced economies and the period after the Great Recession, as argued among the others by Georgiadis and Gräb (2016).

With the inclusion of these terms, the estimated parameters indicate how the coefficient of the original regressor change 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 euro agreement, institutional quality and interactions (see tables A3 and A4 in the Appendix) proving the robustness of the baseline model.

The estimates show that the only group benefiting from the introduction of the single currency was that of high income countries while the middle income group suffered a negative effect. The interaction of the euro dummy with trade openness affected negatively in the short run and long run middle income countries reinforcing the previous result (table 4).

The concentration of negative impacts deriving from trade integration in middle income countries might be related to the prevalence on average for the group of trade diversion over trade creation effects possibly because only five countries over 12 are EMU members (see De Nardis et al 2008 a and b). The government effectiveness had a positive impact on growth only in the long run and in the middle income countries.

Table 4 - Institutional quality, trade agreements and global financial crisisand growth

	OECD	low income*	middle income	high income
Short run effects				
D.trade_open	0.0976***	0.258***	0.0557**	0.0941***
	(0.0147)	(0.0813)	(0.0240)	(0.0300)
D.government effectiveness	-0.00868	0.0244	0.00356	-0.00496
	(0.00889)	(0.0273)	(0.0142)	(0.0209)
euro	-0.00499	0.0156	-0.00362	-0.00668
	(0.00405)	(0.0141)	(0.0145)	(0.00616)
D.trade*euro	-0.00829	-0.0417	-0.00824	0.0252*
	(0.00876)	(0.0404)	(0.0224)	(0.0131)
D.trade*gov	-0.0445***	-0.0320	-0.0182	-0.0309
	(0.0123)	(0.0690)	(0.0213)	(0.0365)
Long run effects				
L.trade_open	0.0788***	0.263***	0.0722***	0.0654**
	(0.0109)	(0.0553)	(0.0204)	(0.0255)
L. government effectiveness	-0.00961	0.106***	-0.00694	0.00228
	(0.00785)	(0.0258)	(0.0145)	(0.0216)
L.trade*euro	0.00242	-0.0160	0.0165	0.0194
	(0.00656)	(0.0497)	(0.0250)	(0.0121)
L.trade*gov	-0.0536***	-0.111	-0.0267	-0.0828**
	(0.0117)	(0.101)	(0.0251)	(0.0379)
Crisis_2008	-0.0233***	0.00809	-0.0355***	-0.0240***
	(0.00580)	(0.0303)	(0.0101)	(0.00730)
Observations	470	61	202	207
R-squared	0.730	0.971	0.721	0.803
Number of cod	26	4	11	11
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

As for the interaction of the latter with trade openness, the coefficient indicates that it reduced the advantages of trade for the OECD area as whole, particularly in the long run and for high income countries. One possible explanation relies on the fact that the effective implementation of provisions on environment protection and product quality might have reduced trade profits margin and consequently returns on income per capita.

The EMU membership proved to reduce inequality in middle income countries and to increase it in high income countries (table 5). While if interacted with trade openness it decreased inequality in short and long run in middle and high income countries.

Table 5 - Institutional quality, trade agreements and global financial crisis and income inequality

	OECD	low income*	middle income	high income
Short run effects				
D.trade_open	-0.0170*	-0.0157	-0.0268**	-0.0288
	(0.0100)	(0.0174)	(0.0122)	(0.0197)
D.government effectiveness	0.00519	-0.0160**	0.00204	-0.000670
	(0.00634)	(0.00631)	(0.00681)	(0.0137)
euro	0.00299	0.000269	-0.0120*	0.0108**
	(0.00282)	(0.00401)	(0.00715)	(0.00445)
D.trade*euro	0.00290	0.0126	-0.0242**	-0.00261
	(0.00513)	(0.00827)	(0.0101)	(0.00849)
D.trade*gov	0.0215**	-0.0206	0.0189*	0.0475*
	(0.0100)	(0.0155)	(0.0108)	(0.0261)
Long run effects				
L.trade_open	-0.00617	-0.0446**	-0.0165*	-0.0271
	(0.00679)	(0.0210)	(0.00987)	(0.0194)
L. government effectiveness	0.0116*	-0.0124**	0.0110	0.0286**
	(0.00601)	(0.00567)	(0.00787)	(0.0144)
L.trade_euro	-0.00488	0.0161	-0.0314***	-0.0161**
	(0.00389)	(0.0112)	(0.0114)	(0.00778)
L.trade*gov	0.0310***	-0.0479*	0.0194*	0.0581*
	(0.00777)	(0.0246)	(0.0115)	(0.0296)
Crisis 2008	Dropped	-0.0111*	0.0194**	-0.00113
		(0.00812)	(0.00673)	(0.00567)
Observations	335	58	121	195
R-squared	0.226	0.947	0.660	0.362
Number of cod	19	4	7	11
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The government effectiveness in low income countries, decreased inequality in short and long run. While in the long run the quality of institutions have worsened the inequality in high income countries. The interaction with trade openness on inequality confirmed these results.

One possible explanation is that in high income countries governments implemented policies that favored efficiency over equity while the opposite occurred in low income countries. In any case, our model is too simplified to draw robust conclusions and this issue need a further and deeper

investigation. Eventually the global financial crisis affected negatively the income per capita in all the three groups of countries and inequality only in low income countries.

Concluding remarks

The evidence presented in this paper indicates that in OECD countries trade and financial openness exerted heterogeneous impacts on per capita GDP and income inequality, especially once considering separately country groups disentangled for "low", "medium" and "high" income levels and differentiating the analysis for the short and long term.

Interestingly enough, our results indicate that trade openness in the past two decades has had a positive impact on growth in the OECD as a whole both in short and long terms. Moreover, it improved mostly per capita GDP of low income members, consistently with the catching up theory. It also decreased inequality in low and middle income OECD countries in the short and long term, although to a different extent. Thus the evidence provided by this paper suggests that trade is a driver of sustainable and equitable growth and thus implementing protectionist measures might be detrimental for growth and increase inequality.

The estimates results for what concerns financial integration are not unique. The latter has had a positive and significant impact on middle income countries' growth but only in the short run. Thus, differently from trade financial integration cannot be considered a permanent driver of growth. Moreover, it had a heterogeneous impact on income inequality among OECD countries groups. It worsened income distribution in low income economies in the short term and in high income countries in the long run. These results suggest that given the very high heterogeneity of financial integration effects even in the relatively homogeneous OECD group of countries, implementing "one size fits all" financial policies might be even counterproductive. A more coherent set of domestic and international policies might be more appropriate to make the financial channel reducing inequality and fostering sustainable growth.

Looking at the fiscal control variables, interestingly enough, public spending is negatively related to growth but reduced inequality in the long run, especially in middle and high income countries. Nevertheless, the payment of interests on public debt hampers growth in the short run and worsens inequality, although with different intensity among the three income groups of countries. These results suggest that fiscal consolidation might have contributed to increase growth and reduce income inequality specifically through the reduction of the amount of interests paid on the public debt.

Government effectiveness is positively related to growth in low income group. However, if we consider the interaction between the government effectiveness and trade openness it seems that in the long run and in the high income group of countries higher government effectiveness had a negative impact on income per capita. One possible explanation is that the effective implementation of provisions on environmental protection and product quality, that characterised the past two decades in the OECD, might have reduced overall trade profits margins and consequently income per capita.

On behalf of all authors, the corresponding author states that there is no conflict of interest.

References

Autor, D., Dom D., Hanson G. and J. Song (2014), "Trade Adjustment: Worker-Level Evidence," Quarterly Journal of Economics 129(4): 1799 –1860

Beck, T., Demirguc-Kunt, A., and Levine, R. (2007). Finance, Inequality, and Poor. *Journal of Economic Growth*, 12(1), 27-49

Bourguignon F. and C. Morrisson. 2002. "Inequality Among World Citizens: 1820– 1992." American Economic Review 92(4):727–44.

Bumann, Silke, and Robert Lensink. (2016): "Capital account liberalization and income inequality." *Journal of International Money and Finance* 61 143-162.

Busse, M. and Koeniger, J. (2012), Trade and Economic Growth: A Re-Examination of the Empirical Evidence No 123, HWWI Research Papers

Cattaneo, O., Gereffi, G., & Staritz, C. (Eds.). (2010). Global value chains in a postcrisis world: a development perspective. World Bank Publications.

Chinn, M.D., and H. Ito. (2008): "A new measure of financial openness." *Journal of comparative policy analysis* 10.3 309-322.

Dabla-Norris, M. E., Kochhar, M. K., Suphaphiphat, M. N., Ricka, M. F., Tsounta, E. (2015). *Causes and consequences of income inequality: A global perspective*. IMF Staff Discussion Note, N. 13.

de Nardis S., De Santis R. and C. Vicarelli (2008) a, "The single currency's effects on Eurozone sectoral trade: winners and losers?", Economics, vol.2, n.17

de Nardis S., De Santis R. and C. Vicarelli (2008) b, "The Euro's Effects on Trade in a Dynamic Setting", European Journal of Comparative Economics, vol5, n.1.

Davis, D. (1996): "Trade Liberalization and Income Distribution", NBER Working Paper, No.5693, National Bureau of Economic Research, Cambridge (Mass.)

Dowrick, S. and J. Golley (2004), 'Trade openness and growth: who benefits?,' Oxford Review of Economic Policy, 20 (1), 38-56.

Ebenstein A., Harrison A., McMillan M. and S. Phillips, (2014). "Estimating the Impact of Trade and Offshoring on American Workers using the Current Population Surveys," The Review of Economics and Statistics, MIT Press, vol. 96(3), pages 581-595, October

Edwards, S. (1998), Openness, Productivity and Growth: What Do We Really Know?,Economic Journal 108(447): 383-98.

Eichengreen, B., D. Park and K. Shin. 2013. "Growth Slowdowns Redux: New Evidence on the Middle-Income Trap," NBER Paper Series, WP 18673.

Elsby, M., Hobijn, B. and S., Aysegül, (2013). "On the Importance of the Participation Margin for Market Fluctuations," Working Paper Series 2013-05, Federal Reserve Bank of San Francisco

Feenstra, R. and G. H. Hanson, 2003. "Global Production Sharing and Rising Inequality: A Survey of Trade and Wages," in Choi, E.K. and J. Harrigan, eds. Handbook of International Trade. Blackwell: Malden

Frankel, J. and D. Romer (1999), Does Trade Cause Growth?, American Economic Review 89(3): 379-399.

Furceri, D., and Loungani, P.(2015). Capital Account Liberalization and Inequality. IMF working paper

Georgiadis, G., and Gräb, J. (2016). Growth, real exchange rates and trade protectionism since the financial crisis. Review of International Economics, 24(5), 1050-1080.

Green D., 2016, “A Historical View of the Politics of Inequality,” in World Social Science Report 2016, UNESCO and the ISSC, Paris

Greenwood, J., and Jovanovic, B. (1990). Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy*, 98(5), 1076-1107

Helpman, E., Itskhoki, O., Muendler, M-A., and S. J. Redding, 2012. “Trade and Inequality: From Theory to Estimation,” NBER Working Paper, No. 17991

Jeanneney, S. G., and Kpodar, K. (2011). Financial Development and Poverty Reduction: Can There Be a Benefit Without a Cost? *The Journal of Development Studies*, 47(1), 143-163

Kaufmann, D., A. Kraay and M. Mastruzzi (2010), ‘The Worldwide Governance Indicators: A Summary of Methodology, Data and Analytical Issues’, World Bank Policy Research Working Paper 5430 (Washington, DC: World Bank Policy Research)

Kunieda. T., Okada. K., and Shibata. A. (2011). Finance and Inequality: How Does Globalization Change Their Relationship? MPRA Paper No.35358

Lakner, C., and B. Milanovic, 2016, “Global Income Distribution: From the Fall of the Berin Wall to the Great Recession,” World Bank Economic Review 30(2): 203 – 232

Lee, E. and Vivarelli, M. (2006): “The Social Impact of Globalization in Developing Countries”, International Labour Review, Vol. 145 (3), pp. 167-184.

Lim, G. C., and Paul D. McNelis. (2016): "Income growth and inequality: The threshold effects of trade and financial openness." *Economic Modelling*, 58 403-412.

Naceur S. and R. Zhang, (2016). "Financial Development, Inequality and Poverty; Some International Evidence," IMF Working Papers 16/32,

OECD, (2011), Divided we Stand: Why Inequality Keeps Rising. Paris: OECD.

Pesaran, M. Hashem & Smith, Ron, 1995. "Estimating long-run relationships from dynamic heterogeneous panels," Journal of Econometrics, Elsevier, vol. 68(1), pages 79-113.

Quah, D. T. (1996). Twin peaks: growth and convergence in models of distribution dynamics. *The economic journal*, 1045-1055.

Rajan, R.G. and L. Zingales. (2003). The Great Reversals: The Politics of Financial Development in the 20th Century. Journal of Financial Economics 69, 1: 5-50.

Roser, M. and C. Cuaresma, Jesus (2016) Why is Income Inequality Increasing in the Developed World? Review of Income and Wealth, 62 (1). pp. 1-27

Sala-i-Martin, X.; G. Doppelhofer and R. I. Miller (2004), Determinants of Long-term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach, American Economic Review 94(4): 813-835

Solt, Frederick. 2016. “The Standardized World Income Inequality Database.” *Social Science Quarterly* 97(5):1267-1281.

Stock, J. H. (1987). Asymptotic properties of least squares estimators of cointegrating vectors. *Econometrica: Journal of the Econometric Society*, 1035-1056.

Westerlund, J. (2007). Testing for error correction in panel data. *Oxford Bulletin of Economics and statistics*, *69*(6), 709-748.

Wood, A. (1994): “North-South trade, employment, and inequality: Changing fortunes in a skill-driven world”, Clarendon Press, Oxford.

APPENDIX

Table A1: Data description

Trade openness	*(Exports +Imports)/GDPt-1*	*Source: OECD*
GDP per capita	*Levels, constat*	*Source: OECD and IMF*
Population	*Levels*	*Source: World Bank*
Terms of trade	*(export value/export volume)/(import value /import volume)*	*Source: OECD*
Financial openness	*Net foreign assets+ liabilities (NFA+NFL)/GDPt-1.*	*Source: EWNII Milesi Ferretti (2017)*
R&D expenditure	*% of GDP*	*Source: OECD*
Goverment effectivenes	*Government effectiveness captures perceptions of thequality 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.*	*Source: World Bank WGI* *Kaufmann, Kraay and Mastruzzi (2010**).***
Public expenditure	*% of GDP*	*Source: OECD*
Interests on public debt	*% of GDP*	*Source: OECD*
Gini index	*The Gini index computed on disposable income (income after taxes and benefits)*	*Source: Standardized World Income Inequality Database, Solt (2016)*
Value added per worker with tertiary education	*% of VA*	*ILO and OECD databases*
Labour share	*(Compensation of employees corrected for self-employed)/(Nominal value added at factors' cost)*	*Source: OECD*

Tab A2 Descriptive statistics

VARIABLES	N	mean	standard dev	min	max
debt_GDP	845	57.63	38.29	3.664	242.1
eu	888	0.377	0.485	0	1
euro	888	0.235	0.424	0	1
fin_open	808	10.15	37.80	0.410	333.8
GDP_k	886	11.34	24.83	0.0900	187.8
GDP_pck	886	33,086	14,893	8,066	99,515
gfi	800	3.120e+12	3.632e+13	678,105	4.872e+14
gini_disp	789	31.63	6.709	20.30	52.30
gini_mkt	789	47.41	5.358	29	62
goveff	735	1.328	0.573	-0.265	2.354
infla	884	6.501	70.24	-1.676	2,076
int_GDP	838	2.079	2.238	-2.965	16.38
k_pc	453	14.47	13.55	0.427	62.86
lp	738	0.773	0.364	0.105	2.087
lp_a	690	0.0285	0.0147	0.00230	0.0954
nfa	764	-85,078	739,199	-7.597e+06	3.420e+06
pe_GDP	853	41.59	9.025	14.24	65.69
ppe_GDP	838	39.55	8.821	13.79	63.73
r_d	792	9.104e+11	2.004e+13	-5.929e+07	5.510e+14
rulaw	735	1.283	0.610	-0.727	2.100
teratt	668	26.92	10.28	7.011	56.27
terms_trade	841	0.989	0.122	0.499	1.614
trade_open	847	0.922	0.567	0.146	4.134

Table A3 - Institutional quality, trade integration and income convergence between countries

	OECD	low income*	middle income	high income
D.trade_open	0.0976***	0.258***	0.0557**	0.0941***
	(0.0147)	(0.0813)	(0.0240)	(0.0300)
D.fin_open	0.0142*	-0.0324	0.0139	-0.00432
	(0.00802)	(0.0505)	(0.0103)	(0.0139)
D.terms_trade	-0.0418	-0.419*	-0.0858	-0.0309
	(0.0302)	(0.218)	(0.0531)	(0.0396)
D.ppe_GDP	-0.153***	-0.164*	-0.143***	-0.158***
	(0.0201)	(0.0807)	(0.0378)	(0.0227)
D.int_GDP	-0.00655**	-0.0234	-0.00315	-0.00393
	(0.00282)	(0.0164)	(0.00438)	(0.00456)
D.lp_a	0.0251**	-0.0620	0.0207	0.0374**
	(0.0111)	(0.0422)	(0.0207)	(0.0159)
D.gov	-0.00868	0.0244	0.00356	-0.00496
	(0.00889)	(0.0273)	(0.0142)	(0.0209)
deu	-0.00499	0.0156	-0.00362	-0.00668
	(0.00405)	(0.0141)	(0.0145)	(0.00616)
D.trade_eu	-0.00829	-0.0417	-0.00824	0.0252*
	(0.00876)	(0.0404)	(0.0224)	(0.0131)
D.trade_gov	-0.0445***	-0.0320	-0.0182	-0.0309
	(0.0123)	(0.0690)	(0.0213)	(0.0365)
L.GDP_pck	-0.112***	-0.262***	-0.0898***	-0.145***
	(0.0162)	(0.0642)	(0.0303)	(0.0326)
L.trade_open	0.0788***	0.263***	0.0722***	0.0654**
	(0.0109)	(0.0553)	(0.0204)	(0.0255)
L.fin_open	0.00624	0.0172	8.89e-05	0.00242
	(0.00479)	(0.0459)	(0.00659)	(0.00780)
L.terms_trade	0.0398***	-0.377	0.0441	0.0194
	(0.0132)	(0.271)	(0.0296)	(0.0154)
L.ppe_GDP	-0.109***	-0.0429	-0.135***	-0.125***
	(0.0162)	(0.0999)	(0.0285)	(0.0208)
L.int_GDP	0.00272	-0.0271	0.00116	0.00982***
	(0.00191)	(0.0215)	(0.00349)	(0.00288)
L.lp_a	0.0217***	-0.0376	0.0164	0.0281***
	(0.00598)	(0.0402)	(0.0105)	(0.00989)
L.gov	-0.00961	0.106***	-0.00694	0.00228
	(0.00785)	(0.0258)	(0.0145)	(0.0216)
L.trade_eu	0.00242	-0.0160	0.0165	0.0194
	(0.00656)	(0.0497)	(0.0250)	(0.0121)
L.trade_gov	-0.0536***	-0.111	-0.0267	-0.0828**
	(0.0117)	(0.101)	(0.0251)	(0.0379)
Crisis_2008	-0.0233***	0.00809	-0.0355***	-0.0240***
	(0.00580)	(0.0303)	(0.0101)	(0.00730)
Constant	1.695***	2.609***	1.564***	2.125***
	(0.193)	(0.858)	(0.349)	(0.390)
Observations	470	61	202	207
R-squared	0.730	0.971	0.721	0.803

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, the estimates controls for country and year FE

Table A4 - Institutional quality, trade integration and income convergence within countries

	OECD	low income*	middle income	high income
D.trade_open	-0.0170*	-0.0157	-0.0268**	-0.0288
	(0.0100)	(0.0174)	(0.0122)	(0.0197)
D.fin_open	0.0102	0.00805	0.00493	0.0109
	(0.00675)	(0.0114)	(0.00861)	(0.00977)
D.ppe_GDP	-0.0220*	-0.0329**	-0.0217	-0.0101
	(0.0133)	(0.0157)	(0.0221)	(0.0169)
D.int_GDP	0.00225	-0.000148	0.00277	0.00254
	(0.00162)	(0.00314)	(0.00180)	(0.00270)
D.lp_a	-0.00246	0.0149*	0.0403***	-0.0256**
	(0.00705)	(0.00777)	(0.0108)	(0.0102)
D.LS	0.0287		-0.159**	0.201***
	(0.0507)		(0.0640)	(0.0752)
D.gov	0.00519	-0.0160**	0.00204	-0.000670
	(0.00634)	(0.00631)	(0.00681)	(0.0137)
deu	0.00299	0.000269	-0.0120*	0.0108**
	(0.00282)	(0.00401)	(0.00715)	(0.00445)
D.trade_eu	0.00290	0.0126	-0.0242**	-0.00261
	(0.00513)	(0.00827)	(0.0101)	(0.00849)
D.trade_gov	0.0215**	-0.0206	0.0189*	0.0475*
	(0.0100)	(0.0155)	(0.0108)	(0.0261)
L.ineq	-0.116***	-0.250**	-0.0719**	-0.179***
	(0.0219)	(0.112)	(0.0319)	(0.0343)
L.trade_open	-0.00617	-0.0446**	-0.0165*	-0.0271
	(0.00679)	(0.0210)	(0.00987)	(0.0194)
L.fin_open	0.00265	0.0127	-0.0122*	0.00971*
	(0.00411)	(0.0148)	(0.00707)	(0.00538)
L.ppe_GDP	-0.00954	-0.0302*	-0.0403**	0.0104
	(0.0120)	(0.0150)	(0.0202)	(0.0163)
L.int_GDP	0.00131	-0.000950	0.00465***	-0.00229
	(0.00122)	(0.00414)	(0.00153)	(0.00195)
L.lp_a	0.00592	0.0149**	0.00481	-0.0153**
	(0.00387)	(0.00540)	(0.00497)	(0.00707)
L.LS	-0.0371		-0.0854**	0.0504
	(0.0267)		(0.0350)	(0.0425)
L.gov	0.0116*	-0.0124**	0.0110	0.0286**
	(0.00601)	(0.00567)	(0.00787)	(0.0144)
L.trade_eu	-0.00488	0.0161	-0.0314***	-0.0161**
	(0.00389)	(0.0112)	(0.0114)	(0.00778)
L.trade_gov	0.0310***	-0.0479*	0.0194*	0.0581*
	(0.00777)	(0.0246)	(0.0115)	(0.0296)
2008.year		-0.0111*	0.0194**	-0.00113
	(0.00567)	(0.00812)	(0.00673)	(0.00567)
Constant	0.598***	1.039**	0.774***	0.261
	(0.165)	(0.383)	(0.243)	(0.230)
Observations	335	58	121	195
R-squared	0.226	0.947	0.660	0.362

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, the estimates controls for country and year FE