The financial Kuznets curve: Evidence for the euro area*

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Abstract

The paper introduces a new specification of the Kuznets curve, where turning point per capita income is conditioned to the level of financial development. It then yields new evidence on income inequality dynamics for euro area (EA) countries since the mid-1980s. We find strong evidence in favor of an EA-wide *financial Kuznets curve*. The inverse linkage between economic development and income inequality would not have been undermined by the recent financial and economic crises. From a policy perspective, our findings highlight the importance of financial deepening in fostering not only economic growth, but also a more even distribution of income.

Keywords: Euro area; financial development; financial stability; income distribution inequality; Kuznets curve; real convergence; subprime mortgage and sovereign debt crisis.

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1 Introduction

Recent contributions to the Kuznets (1955) curve literature explain its inverse-U shape through the adoption of new technologies, shifting the economy from an unsophisticated to a modern financial system, strictly dependent on banking activities and stock markets (Greenwood and Jovanovic, 1990; Barro, 2000; Aghion and Howitt, 1997). In this framework, financial development leads to a more even distribution of income by allowing access to finance to a larger population share (Greenwood and Jovanovic, 1990; Smith, 2003; Deidda, 2006; Townsend and Ueda, 2006; Kim and Lin, 2011).[1] Financial development also contributes to economic growth through improved physical and human capital accumulation and technological innovation (Smith, 2003; Beck et al., 2000). Due to informational asymmetries, technological progress can however make screening tools in the financial industry outdated, in turn requiring financial innovation to maintain the effective selection of profitable investment projects, and therefore its contribution to economic growth (Laeven et al., 2015).

Supporting empirical evidence for the above *long-term* view has been found by various cross-sectional (*between*) analyses and panel data studies using multi-year averaging to control for business cycle effects (Beck et al., 2007; Kappel, 2010; Li et al., 1998; Clarke et al., 2006). Nonlinearity such as threshold and asymmetric effects has also been documented. For instance, financial development might lead to a contraction in income inequality only once a threshold level is achieved; moreover, financial deepening decreases inequality more strongly for high rather than low-income countries (Kim and Lin, 2011; Kappel, 2010). On the other hand, some contrasting evidence has been yielded by cross-sectional *within* analyses, pooled dynamic panel data and time series studies within a *short-term* perspective (Jaumotte et al., 2008; Jauch and Watzka, 2012; Rodriguez-Pose and Tselios, 2009; Roine et al., 2009; Gimet and Lagoarde-Segot, 2011; Beltratti and Morana, 2007).

In light of the above evidence, the paper proposes a new specification of the Kuznets curve (KC), conditioning its turning point per capita income to the level of financial development. Within this framework, financial development contributes to a more even distribution of income by lowering the turning point per capita income level. Our specification is then an original contribution to the literature, since in previous studies financial deepening enters the KC specification at most as a control variable (Lee, 2006; Barrios and Strobl, 2009; Beck et al., 2007; Rodrıguez-Pose and Tselios, 2009; Roine et al., 2009; Jauch and Watzka, 2012).

In light of recent trends in income distribution inequality for the euro area (EA), pointing to a 2.5% average increase over the period 2008 through 2013 (see also Bertola, 2013; D'Errico et al., 2015), our empirical analysis is then focused on real within-country income convergence for the current 19 EA member states. By covering the most relevant events in the European Monetary Union history since the 1990s, from the removal of all restrictions to capital flows between member states, the currency crisis and the introduction of the euro, through the subprime financial crisis in 2007 and the EA sovereign debt crisis in 2010, the assessed sample is highly informative on the various dimensions through which financial deepening and income inequality might be interrelated.

To preview the results of the paper, we find strong empirical evidence in favor of an EA-wide *financial Kuznets curve* (FKC); the inverse link between economic development and income inequality would not have been undermined by the recent financial crises, which have however sizably affected income distribution across euro area countries.

The rest of the paper is as follows. Section 2 deals with the specification and estimation

[1] As financial intermediation is costly, in an unsophisticated financial system only the rich initially benefit from better financial markets, while the poor have to rely on informal, family connections for funding. Yet, once the diffusion of financial intermediation throughout society has sufficiently progressed, financial deepening leads to a more even distribution of income by lowering information and transaction costs, and allowing access to financial services to agents (small firms; the poor) who, due to a lack of collateral and credit histories, are severely constrained by inherited wealth.

of the financial Kuznets curve, while Sections 3 and 4 present the data and estimation results. The effects of financial crisis on inequality are then discussed in Section 5. Finally, conclusions are reported in Section 6.

2 Specification and estimation of the financial Kuznets curve

2.1 The financial Kuznets curve

Consider the model

$$y_n = a_n + bx_n + cx_n^2 \tag{1}$$

where n refers to the n-th country, $n = 1, ..., N$, y_n is a measure of income inequality, i.e., the Gini Index, x_n is a wealth/economic development indicator, i.e., the real per capita income/GDP level, a_n is a country-fixed effect. Coefficients b and c obey the restrictions $b > 0$ and $c < 0$, in order (1) to be consistent with the inverse-U shaped relationship posited by Kuznets (1955).

The KC turning point ($x_n^\star$) can then be obtained by maximizing (1) with respect to x_n, yielding

$$x_n^\star = -\frac{b}{2c}. \tag{2}$$

Following Bradford et al. (2005), by differentiating (1) with respect to time and substituting (2) it is obtained

$$\begin{aligned} \frac{\partial y_n}{\partial t} &= (b + 2cx_n)\frac{\partial x_n}{\partial t} \\ &= \alpha(x_n - x_n{}^\star)g_n \end{aligned} \tag{3}$$

where $\alpha \equiv 2c < 0$ and $g_n \equiv \frac{\partial x_n}{\partial t}$ is the (per capita) income growth rate in each country.

The instantaneous change in economic inequality then depends on the per capita income growth rate g_n and on the distance of x_n from its turning point $x_n{}^\star$; moreover, assuming $g_n > 0$, inequality increases when $x_n < x_n{}^\star$ and decreases when $x_n > x_n{}^\star$.

By conditioning the turning point per capita income in (2) to the level of financial development (f_n), i.e.,

$$x_n{}^\star = \lambda_0 + \lambda_1 f_n \tag{4}$$

and substituting (4) in (3), one has

$$\frac{\partial y_n}{\partial t} = \beta_0[x_n - (\lambda_0 + \lambda_1 f_n)]g_n \tag{5}$$

where λ_0 and λ_1 are parameters, with $\lambda_1 < 0$ implying that a country with more developed financial markets reaches the KC turning point at a relatively lower income level than a country with a less developed financial system.

2.2 Econometric specification

The panel model log-log specification used in our empirical analysis is derived by integrating (5) over time, yielding

$$\ln y_{nt} = \mu + \beta_0(\ln x_{nt} g_{nt}) + \beta_1 g_{nt} + \beta_2(\ln f_{nt} g_{nt}) + \boldsymbol{\delta}' \ln \mathbf{z}_{nt} + \varepsilon_{nt}, \quad n = 1, ..., N, \quad t = 1, ..., T \tag{6}$$

where $\beta_0 \equiv 2\alpha < 0$ as required by the inverse relationship between income inequality and the level of economic development posited by the KC; $\beta_2 \equiv -\beta_0\lambda_1 < 0$ consistent with the hypothesis of an inverse relationship between financial development and the turning point of the

KC. On the other hand, the intercept μ, β_1 and the $k \times 1$ vector of parameters $\boldsymbol{\delta}$, corresponding to the k control variables $\mathbf{z}_{nt}$, can take either positive or negative values. Finally, ε_{nt} are zero mean, constant variance i.i.d. disturbances. From the coefficients β_0, β_1 and β_2, the structural parameters of interest λ_0 and λ_1 can then be obtained as $\lambda_0 \equiv -\frac{\beta_1}{\beta_0}$ and $\lambda_1 \equiv -\frac{\beta_2}{\beta_0} < 0$. Note that the above specification is fully consistent with the restriction $g_{nt} > 0$ posited above, which is imposed in estimation.

3 The data

The dataset is an unbalanced panel of annual observations for the 19 current EA member countries, covering the period 1985-2013 ($N = 19$ and $T = 28$), i.e., Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Portugal, Slovakia, Slovenia and Spain.[2]

Income inequality (y) is measured by means of the *net income* Gini Index, computed by using household disposable income (post-tax, post-transfer), as reported in the Standardized World Income Inequality Database (SWIID).

The level of economic development is measured by real per capita GDP (x) at year 2005 constant prices and is obtained by the World Bank Development Indicators Database (2015 Edition). This variable is then used to compute the series g, which is the rate of growth of per capita income in each country and for each year.

Moreover, liquid liabilities are used as a proxy for financial development (f). The latter variable has been widely employed as an alternative to the GDP shares of credit and stock market capitalization in previous studies (see Li et al., 1998; Clarke et al., 2006; Beck et al., 2007; Jaumotte et al., 2008; Rodriguez-Pose and Tselios, 2009; Roine et al., 2009; Kappel, 2010; Kim and Lin, 2011; Gimet and Lagoarde-Segot, 2011 and Jauch and Watzka, 2012). We compute the GDP share of liquid liabilities using M3, which, by including total deposits held by the private sector in the banking system, yields a measure of the liability side of the financial system. Higher values of this indicator imply easier access to finance. Moreover, it reflects trust of creditors in the financial system. As a measure of the (inverse) income velocity of circulation of money, it also conveys information on the pace of innovations in the payment system, as for instance those brought about by the introduction of ATMs, the use of card, internet and mobile payments, electronic bill presentment and improvements in infrastructure and security (BIS, 2012).

Furthermore, in order to account for the influence of factors other than economic growth and financial development on income inequality, different control variables are included, i.e., the *age dependency ratio* (DEP); the GDP share of *government spending* (PE), the *spread* between the interest rate on 10-year government bonds relative to the interest rate paid on 10-year German Treasury bonds (SPR); *globalization/trade openness* (TRD), as measured by the GDP share of exports plus imports. Concerning their effects, consistent with the available literature (see, for instance, Bergh and Nilsson, 2010) we expect an increase in the size of public expenditure and a more generous welfare system (PE, SPR) to lead to a more equal distribution of income. On the other hand, we expect an increase in trade openness (TRD) to yield a worsening in income distribution, due to the downward pressure effect on the wage of unskilled workers exerted by globalization. Similarly for a higher dependency ratio (DEP), signaling a larger share of the population without a regular wage.

[2] In the case of Estonia, Lithuania, Slovakia and Slovenia, observations are avaiable since 1995, 1991, 1992 and 1995, respectively.

4 Empirical results

Table 1 reports OLS estimation results for the panel data model (6) with the inclusion of country and time fixed effects, consistent with the strong national components in income inequality dynamics previously detected for European countries in the literature (Gianetti, 2002; Bottazzi and Peri, 2003).

As shown in the Table, the selected specification is validated by the Hausman test for fixed against random effects, as well as the other mispecification diagnostics. Parameter estimates are also consistent with the underlying theoretical framework, pointing to an inverse-U shaped linkage between inequality and the level of economic development (β_0 parameter) and an inverse linkage between the turning point per capita income level and financial deepening (β_2 parameter). In particular, concerning the KC hypothesis, the estimated β_0 parameter is, as expected, negative and statistically significant, independently of the control variables included in the specification, equal to -0.099 for our preferred model (#2), selected according to statistical significance and explanatory power. Moreover, the inverse relationship between the KC turning point per capita income level and the level of financial development is also clear-cut, as the estimated β_2 parameter is negative and statistically significant across specifications, equal to -0.055 for the selected model (#2).

Coherently, OLS estimates of the structural parameter of interest $\lambda_1 \equiv -\frac{\beta_2}{\beta_0}$ are, as expected, negative in sign, about -0.556 for the selected model. Financial development would then contribute to a more even distribution of income in the EA by lowering the KC turning point per capita income level. On the other hand, OLS estimates of the structural parameter $\lambda_0 \equiv -\frac{\beta_1}{\beta_0}$ are positive, about 1.545 for the selected model.

Finally, concerning control variables, only SPR and TRD are statistically significant. Consistent with expectations, an increase in SPR leads to a more even distribution of income, while an increase in TRD worsens income equality.

4.1 Robustness analysis

Our specification in (6) is coherent with the *supply-lead* view (Patrick, 1966), positing financial deepening to be causal for economic growth and, hence, for income distribution. While the latter view appears to be empirically well grounded (see Demirgüç-Kunt and Levine, 2008), other causal linkages have also been theorized in the literature. The *demand-following* hypothesis, for instance, posits a minor role for finance in economic growth: accordingly, financial development would be a consequence of economic growth, rather than one of its engines (Patrick, 1966; Lucas, 1988; Chandavarkar, 1992). Moreover, in light of Greenwood and Jovanovic (1990), Bangake and Eggoh (2011), and, more recently, of Laeven et al. (2015), feedback effects between growth, inequality and financial development might also be empirically relevant.

In this section we then assess the assumption of weak exogeneity for the level of financial development by means of GMM estimation. Consistent with the available literature, the regressor of interest, fg, is instrumented using the legal origin dummy variables (LO) suggested by La Porta et al. (1997) interacted with the per capita income rate of growth in each countries ($LO \times g$). The latter dummies are related to the geographical origin of the legal framework, which can be connected with four main traditions, i.e., English, French, German and Scandinavian. Being predetermined and containing information on the degree of enforceability of financial contracts, these variables have been proved to be valid instruments (see, among others, Levine et al., 2000; Laeven et al., 2015).[3]

[3]The original dataset of La Porta et al. (1997) has been updated according to *The World Factbook List of Legal System*. Four groups of countries have been defined: English tradition (LO_E): Ireland and Malta; French tradition (LO_F): Belgium, Cyprus, France, Greece, Italy, Luxembourg, the Netherlands, Portugal, Spain; German tradition (LO_G): Austria, Estonia, Germany, Latvia, Slovakia and Slovenia; Scandinavian tradition (LO_S): Finland and Lithuania.

As shown in Table 2, the null hypothesis of valid instruments is never rejected according to the Hansen-J statistic; moreover, according to the Hausman test (Exogeneity), comparing OLS and GMM estimates of the parameter β_2, OLS estimation appears to be fully valid, as in none of the cases the null hypothesis of consistent OLS estimation (weak exogeneity of fg) is rejected. In light of the above findings, we conclude that OLS estimation of the parameters of interest is fully reliable.

5 Financial crisis and inequality

The analysis carried out in the previous Section is set within a long-term perspective, where financial deepening exerts a positive effect on economic growth. Within this perspective, financial development does not endanger economic stability through the generation of boom-bust financial cycles.

As shown by recent events, financial imbalances can however trigger sizable short-term fluctuations: real EA GDP contracted -5.9% during the subprime mortgage cum sovereign debt crisis (-4.7% in 2009; -1.2% in 2012-2013). In Figure 1 we show levels and rates of growth of per capita income and the net Gini Index during the recent crises. In particular, level figures are computed as the averages over the period 2008-2013 (y and s), while rates of change as the relative deviation of the latter average figures from their actual values in 2007 ($y_{\%}$ and $x_{\%}$).

As shown in Figure 1 (top plot), income inequality falls as the level of real per capita income increases also during the crisis; hence, the recent financial crises would not have undermined the validity of the KC, established over the whole estimation sample (yet under the restriction $g > 0$). Moreover, a (weak) U-shaped linkage relates income inequality and real per capita income growth (bottom plot). The plot clearly shows that countries such as Cyprus, Greece and Spain, where the economic recession was deeper, also experienced a higher than average increase in income inequality; similarly, for Estonia, France and Slovenia. A higher than average increase in income inequality was however also scored in countries less affected by the financial and economic crises, yet where redistributive policies were possibly less marked (Austria, Germany, Malta, Slovakia). For the opposite reason, income inequality appears to decrease in Belgium, Finland, Ireland, Italy, Latvia, Lithuania, Luxemburg, the Netherlands, and Portugal, despite the sizable economic recession. The above scattered evidence is fully consistent with the strong national component in income distribution already detected for European countries in previous studies (see Gianetti, 2002; Bottazzi and Peri, 2003). This is possibly accounted for by the different degree of social protection and depth of redistributive policies implemented across EA countries during the recent crises.

6 Conclusions

The paper introduces a new specification of the KC, where turning point per capita income is conditioned to the level of financial development. It then provides new evidence on income inequality dynamics for the EA since the mid-1980s.

We find strong evidence in favor of an EA-wide *financial Kuznets curve*, i.e., of an inverse-U shaped linkage between inequality and income development, where financial deepening contributes to a more even distribution of income by lowering the per capita income level at which the turning point of the KC occurs.

The inverse linkage between inequality and economic development would not have been undermined by the recent financial and economic crises. In fact, the assessment of post-2007 figures still points to an inverse relationship between income inequality and per capita income levels. Moreover, a (weak) U-shaped linkage can be noted between inequality and per capita income growth: countries such as Greece, Cyprus and Spain, where the economic recession was deeper, also experienced a higher than average increase in income inequality; a higher than

average increase in income inequality was however also observed in countries less affected by the financial and economic crises, yet where redistributive policies were possibly less marked (Austria, Germany, Malta, Slovakia). For the opposite reason, despite the sizable economic recession, income inequality appears to have decrease in Belgium, Finland, Ireland, Italy, Latvia, Lithuania, Luxemburg, the Netherlands and Portugal.

From a policy perspective, financial deepening appears to be instrumental not only to foster economic growth, but also to achieve a more even distribution of income. It should then be counted as an additional, *financial* pillar to the economic, social and environmental pillars of the *Lisbon Strategy*, continued in the *Europe 2020 Strategy*.

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Table 1: OLS estimation results of Equation (6)

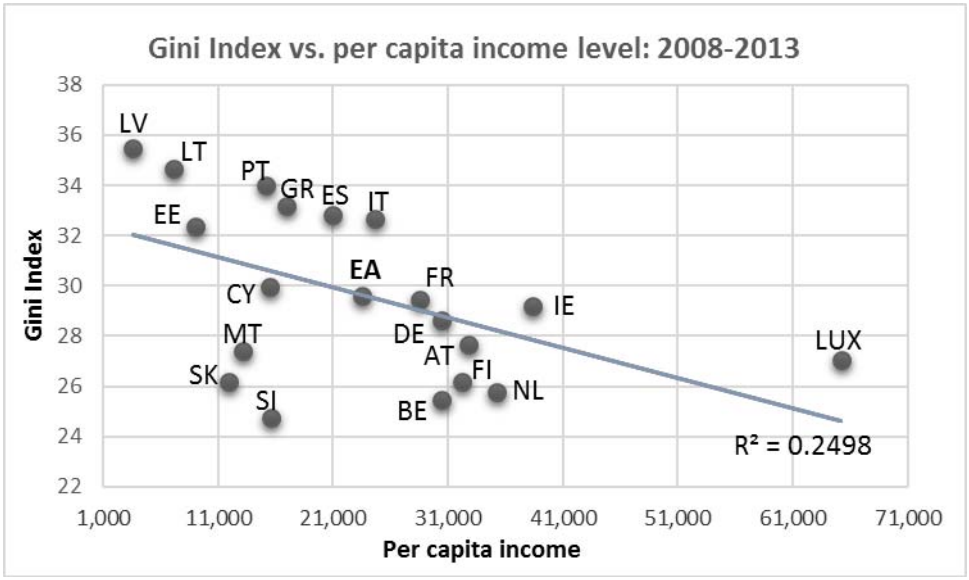
	(1)	(2)	(3)	(4)
x	-0.088**	-0.099***	-0.113***	-0.128**
	(0.037)	(0.037)	(0.040)	(0.050)
g	0.149***	0.153***	0.159***	0.172***
	(0.038)	(0.038)	(0.039)	(0.048)
fg	-0.060***	-0.055***	-0.047**	-0.046**
	(0.016)	(0.016)	(0.018)	(0.018)
SPR	-0.008*	-0.009**	-0.008**	-0.008*
	(0.004)	(0.004)	(0.004)	(0.004)
TRD		0.077**	0.087**	0.089**
		(0.039)	(0.040)	(0.040)
PE			0.027	0.028
			(0.026)	(0.026)
DEP				-0.037
				(0.077)
Constant	4.551***	4.266***	4.213***	4.487***
	(0.373)	(0.398)	(0.401)	(0.703)
Country and Time Fixed Effects	Yes	Yes	Yes	Yes
R-squared	0.336	0.345	0.348	0.348
Hetero	33.179 [0.314]	32.433 [0.396]	43.220 [0.089]	57.031 [0.006]
Reset	0.760 [0.385]	0.410 [0.522]	0.270 [0.602]	0.760 [0.383]
Hausman	239.090 [0.000]	245.140 [0.000]	244.190 [0.000]	239.090 [0.000]
Indirect estimates of structural parameters				
λ_0	1.693	1.545	1.407	1.344
λ_1	-0.682	-0.556	-0.416	-0.359
Obs	327	327	327	327

The Table reports OLS estimates with robust standard errors in round brackets. Income inequality is measured by the net income Gini Index (*y*) and financial development *f* by the GDP share of liquid liabilities. The other regressors are: *xg*, the product of the per capita income level (*x*) and its rate of growth (*g*); *fg*, the product of the financial development index level (*f*) and the per capita income rate of growth (*g*). The control variables are: the 10-year Treasury bond rate spread relatively to the German T-Bund rate (*SPR*), trade openness (*TRD*), government spending (*PE*) and the age dependency ratio (*DEP*). *R-squared* is the unadjusted coefficient of determination; Hetero is the White test for heteroscedasticity; Reset is the Ramsey-Reset functional form test using squares of fitted values; Hausman is the Hausman test for random against fixed effects. P-values are reported in square brackets. Indirect estimates of the structural parameters λ_0 and λ_1 are computed as follows: $\lambda_0=-\beta_1/\beta_0$ and $\lambda_1=-\beta_2/\beta_0$ respectively. The symbols *, **, *** denotes significance at 10, 5 and 1 per cent level, respectively. The number of observations is denoted by Obs. All the variables are in natural logarithm, apart from the per capita income rate of growth.

Table 2: GMM estimation results of Equation (6)

	(1)	(2)	(3)	(4)
xg	-0.065	-0.074	-0.026	-0.017
	(0.055)	(0.055)	(0.091)	(0.115)
g	0.197**	0.196**	0.207***	0.201***
	(0.090)	(0.077)	(0.061)	(0.059)
fg	-0.130	-0.122	-0.179	-0.182
	(0.119)	(0.105)	(0.125)	(0.126)
SPR	-0.006	-0.007	-0.007	-0.007
	(0.005)	(0.005)	(0.005)	(0.005)
TRD	-	0.051	0.013	0.011
		(0.056)	(0.082)	(0.084)
PE	-	-	-0.061	-0.064
			(0.086)	(0.088)
DEP	-	-	-	0.018
				(0.098)
R-squared	0.291	0.305	0.224	0.219
Country and Time Fixed Effects	Yes	Yes	Yes	Yes
Hansen J	2.408 [0.492]	1.990 [0.574]	1.296 [0.730]	1.271 [0.736]
Exogeneity	0.415 [0.519]	0.494 [0.482]	1.544 [0.214]	1.610 [0.204]
Obs	327	327	327	327

The Table reports GMM estimates with robust standard errors are in round brackets. Income inequality is measured by the net income Gini Index (*y*) and financial development (*f*) is proxied by the GDP share of liquid liabilities. The other regressors are: *xg*, the product of the per capita income level (*x*) and its rate of growth (*g*); *fg* the product of the financial development index (*f*) and the per capita income growth rate (*g*). The control variables are: the 10-year Treasury bond rate spread relatively to the German T-Bund rate (*SPR*), trade openness (*TRD*), government spending (*PE*) and the age dependency ratio (*DEP*). *R-squared* is the unadjusted coefficient of determination; Hansen J is the Sargan-Hansen instruments validity test; Exogeneity is the Hausman test for weak exogeneity of the interacted financial development variable *fg*. P-values are reported in square brackets. The symbols *, **, *** denotes significance at 10, 5 and 1 per cent level, respectively. The number of observations is denoted by Obs. All the variables are in natural logarithm, apart from the per capita income growth rate.



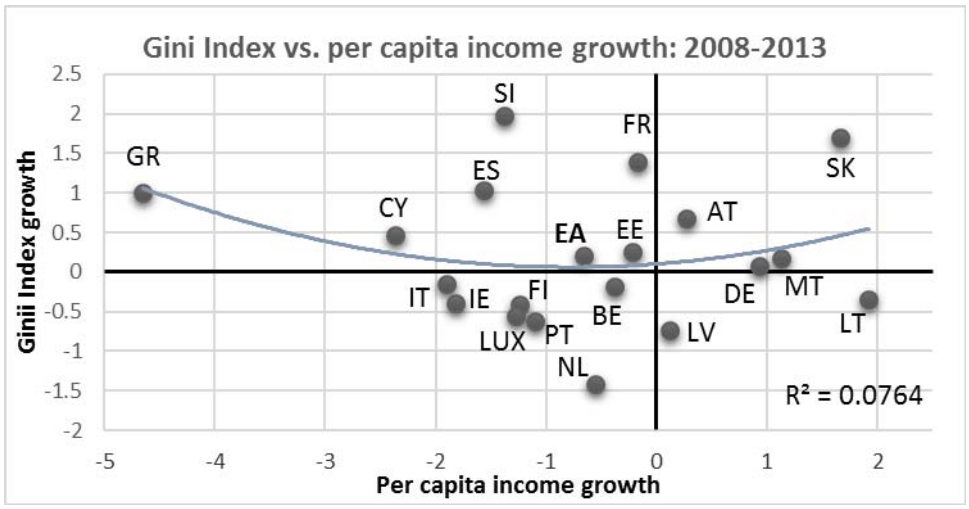


Figure 1: Net Gini Index levels and rates of growth versus corresponding real per capita income figures.