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Re-examining inequality persistence

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Abstract
Although it is not a new phenomenon, in recent years inequality has moved to the top of the political agenda given the concern that will result in political instability and social resentment. Persistence in inequality can further undermine economic growth and development by hindering educational opportunities, human capital formation, and intergenerational mobility. The persistent nature of inequality stands as one of the most serious challenges for the global economy. This paper analyses inequality persistence for a sample of 60 countries from 1984 to 2015. The authors conclude that inequality is persistent and Government redistribution polices through taxes and transfers did not significantly reduce inequality persistence.

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1. Introduction

Income inequality has been rising over the last decades in the vast majority of OECD countries (OECD, 2011 and 2015) as well as across some developing countries (Vieira, 2012). Although it is not a new phenomenon, in recent years inequality has moved to the top of the political agenda given the concern that such unbalanced sharing of income and wealth will result in social resentment and political instability; the September 2018 survey on `What Worries the World' by Ipsos shows high levels of concern on poverty an inequality across the 28 countries surveyed. Worries are link to the fact that the persistence of inequality can undermine growth and development by hindering educational opportunities, human capital formation, and intergenerational mobility. The persistent nature of inequality stands as one of the most serious challenges for the global economy.

Rising inequality can be the result of several factors. First, Murphy (1989) suggested that in the absence of growing supply of skilled workers, technological change will increase the wage gap between skilled and unskilled workers. New technologies may increase the relative productivity of high-skilled workers, their demand and wages (Violante, 2008). Second, globalization has been also suggested to explain the rising trend in inequality. The growing economic integration can also accelerate the distributive effects of skill biased technological change on inequality (Barro, 2000) since it can boost the adoption of new technologies and the demand for skill labour. Trade specialization and off-shoring can reduce the wages of low-skilled workers in developed countries. Third, the ILO (2008) points out that financialisation, that is the deregulation of the financial sector, plays a major role in explaining the observed rise in inequality. Arestis and Sawyer (2005) argue that financial liberalization and financialisation have exposed many countries to macreoconomic and financial instability with huge impact in less developed countries. Fourth, inequality patterns can be related to institutional factors such as labour market regulations (Koeniger et al, 2007), the weakening of collective bargain (Visser and Chechi, 2009) or the structure and size of the fiscal policy and social security systems (Holsch and Kraus, 2006). Rehm (2016) suggests that the welfare state retrenchment has impact negatively on economic equality. According to the OECD (2011), the decline in the effectiveness of tax and benefit systems to redistribute market income has exacerbated the effect of the widening wage disparities, leading to growing inequality. Finally, changes in political and institutional environments can also benefit some households at the expense of others (Rodrik, 1997, Matthijs, 2016).

Despite the causes and consequences of inequality have been largely studied in both the theoretical and the empirical literature, one important feature of inequality trends, its degree of persistence, has been far less under scrutiny. There a two reason that may explain this lack of analysis. First, form a theoretical perspective, the standard neoclassical growth model predicts convergence in income distribution. However, intergenerational transmission models of wealth can explain earnings persistence through inheritance payouts or under-investment in human capital (D'Addio, 2007, Holter, 2014, Piketty, 2014). Institutional and political choices as the structure of wage-bargaining (Bartels, 2008) or the organization of welfare states (Smeeding, 2005) can also explain persistence in inequality. If inequality persists, any innovation causing a rise in inequality will have long-lasting effects. Second, from an empirical perspective, the lack of studies on inequality trends and persistence can be explained by the lack of data on inequality with long enough sample. Earlier studies on inequality focus on building micro-panel data sets based on national household surveys which have a limited time span. This changed when Piketty (2001, 2003) recognising the need for long term analysis, constructed a data set on top income shares in France, spanning the entire twentieth century. This led to a build-up of interest in the long-run developments of inequality, and similar efforts of constructing data sets spanning long time periods for many other countries. For example, The World Income Inequality Database (WIID) by UNU-WIDER (2008) or the Standardized World Income Inequality Database (SWIID) by Solt (2009) compile country-year estimates of summary measures of income distribution (the Gini coefficient in particular) for a long coverage of countries and years (from 1867 for some countries in the WIID, and from 1980 in the case of SWIID). With the recent compilation of long run time series data, there have been several studies that research the long run dynamics of inequality.

Previous research on inequality persistence is however inconclusive. Islam and Madsen (2015) first test for the Piketty hypothesis of a persistent increase of inequality in the 21st century, concluding that shock to inequality are likely to be temporary. In contrast, Christopoulos and McAdam (2017) suggest that inequality is highly persistent although not strictly unit root. In this paper we shed further light on the issue of inequality persistence.

2. Methodology

In recent years, panel unit root tests have become popular in examining the issue of whether shocks to a data series are transitory or permanent where the data sample over time is small. The idea is that the power of panel unit root tests can be significantly increased using the cross section of the data set to compensate for the low power of the standard time-series unit root tests when the time dimension is small.

Over the last twenty years there have been strides made in the area of dynamic panel data econometrics with particular reference to unit root tests. 'First generation' panel unit tests assume cross-sectional independence in the panel units of the data series. The standard tests include those of Maddala and Wu (1999), Levin et al. (2002) and Im et al. (2003). However, this assumption has come under criticism (see for example, O'Connell (1998); Strauss and Yigit (2003) and Banerjee et al. (2005)) for the reason that these tests tend to over-reject the unit root null as they suffer from size distortions and low power.

As a consequence new research has led to 'second generation' panel unit root tests that allow for cross-sectional dependence across the panel units. Such second generation tests include those of Bai and Ng (2004, 2010), Moon and Perron (2004), Pesaran (2007). Palm et al. (2011). In all these tests, the null hypothesis is that of a unit root. In this study we adopt the Pesaran (2007) panel unit root tests that uses the CIPS test statistic, and the procedure due to Palm et. al. (2011) which is the bootstrapping approach to conduct robust to cross-section dependence statistical inference without modelling the form of the cross-section dependence. To implement the Pesaran (2007) procedure the following cross sectionally augmented Dickey Fuller regression is estimated:

$$\Delta G_{it} = \alpha_i + \beta_i G_{it-1} + \gamma_i \bar{G}_{t-1} + \delta_i \Delta \bar{G}_t + \varepsilon_{it}$$

Where $\bar{G}_{t-1} = \frac{1}{N}\sum_i^N G_{it-1}$ and $\Delta\bar{G}_t = \frac{1}{N}\sum_i^N \Delta G_{it-1}$. The CADF tests statistic is obtained by calculating the t-statistic of the OLS estimate of β_i. The CIPS statistic is basically an extension of the Im et. al. (2003) t-bar test which is the average of the CADF tests statistic given by

$$CIPS = \frac{1}{N}\sum_{i=1}^{N} CADF_i$$

The procedure due to Palm et. al. (2011) is based on a block bootstrap based test to address the temporal as well as the cross sectional dependence among the variables. The following model is considered that allows for common factors, denoted F_t, in the model:

$$G_t = \Lambda F_t + e_t$$

Where G_t denotes the Gini coefficient, the factor loadings are given by $\Lambda = (\lambda_1, \dots, \lambda_N)'$, $F_t = (F_{1t}, \dots, F_{dt})'$ and $e_t = (e_{1t}, \dots, e_{Nt})'$ denote the idiosyncratic components. The common factor components and the idiosyncratic components can be modelled as:

$$F_t = \phi F_{t-1} + f_t$$
$$e_t = \theta e_{t-1} + \varpi_t$$

The null hypothesis of a unit root is H_0: $(\phi_j = \theta_i = 1)$ for all $j = 1, \dots, N$ and $= 1, \dots, d$ (see Palm et. al. 2011). The test statistic is given by:

$$\tau = \frac{1}{N}\sum_{i=1}^{N} T \frac{\sum_{t=2}^{T} G_{it-1}\Delta G_{it}}{\sum_{t=2}^{T} G_{it-1}^2}$$

3. Data and empirical results

Inequality persistence is tested using Gini index which is taken from the Standardized World Income Inequality Database (SWIID) developed by Solt (2009, 2014). The SWIID contains Gini indices of net and market income inequality computed from a large set of inequality data sources. Gini net refers to the measure of income inequality once government intervention has taken place, while Gini market is a pre-tax, pre-transfer measure. The use of both measures, Gini market and Gini net, will allow us to check whether the Government

redistribution through the national tax system reduce persistence in inequality. Our sample covers 60 countries[1] with annual data spanning from 1984 to 2015.

Table 1 presents the test for cross sectional dependence in the panel for both the Gini market and the Gini net. In both cases the null hypothesis of sectional independence is rejected. Table 2 reports the result from Pesaran (2007) panel unit root test under cross sectional dependence. According to the results, it is not possible to reject the null of unit root. The Pesaran (2007) test deals with common factor structures and contemporaneous dependence, however, it cannot account for other forms of cross-sectional dependence. In order to consider other plausible dynamic dependences when testing for unit roots in the panel, we apply the Palm, et al (2011) cross-sectional dependence robust block bootstrap panel unit root test. Tables 3A and 3B show the results. We cannot reject the null of unit root.

Table 1. CD Statistic

Lag	Gini market	Gini net
P=0	6.94	8.38
P=1	5.86	6.61
P=2	6.21	6.33
P=3	5.55	5.81

Table 2. CIPS Statistic

Lag	M type		N type	
	CIPS	CIPS-T	CIPS	CIPS-T
P=0	-2.010	-2.006	-1.788	-1.802
P=1	-1.774	-1.774	-1.789	-1.810
P=2	-1.781	-1.781	-1.748	-1.761
P=3	-1.508	-1.508	-1.452	-1.463

Notes: The 10%, 5% and 1% critical values are -2.02, -2.08, -2.19 respectively.

Table 3A. Gini market Palm Smeekes Urbain test

Test	Statistic	10% Crit. Val.	P – val.
Pooled	-3.764	-4.696	0.283
Grp. Mean	-5.105	-5.334	0.163
Median	-3.729	-4.624	0.371

[1] Argentina, Armenia, Australia, Austria, Bangladesh, Belarus, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Croacia, Denmark, Dominican Republic, Ecuador. Estonia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Honduras, Hong-Kong, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Kazakhastan, Kyrgyz Republic, Latvia, Lithuania, Luxembourgh, Malawi, Mexico, Moldova, the Netherlands, New Zealand, Nigeria, Norway, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Russian Federation, Singapore, Slovenia, South Korea, Spain, Sri Lanka, Sweden, Taiwan, Thailand, Turkey, Uruguay, USA, UK and Venezuela.

Table 3B. Gini net Palm Smeekes Urbain test

Test	Statistic	10% Crit. Val.	P – val.
Pooled	-3.176	-4.131	0.285
Grp. Mean	-4.573	-5.004	0.224
Median	-3.413	-4.361	0.395

4. Conclusions

We conclude that inequality is persistent for a set of 60 countries over the period 1984 to 2013. In addition, we find unit root in both the Gini market and the Gini net, implying that Government redistribution polices through taxes and transfers did not significantly reduce inequality persistence.

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