RIC

AndyTitusOkwu,RowlandTochukwuObiakor,TimothyChidiObiwuru,MargretN.Kabuoh,EmekaOkoroAkpa
PUBLIC FAMILY SPENDING, LABOUR PRODUCTIVITY, INCOME INEQUALITY AND POVERTY GAP…   (49 - 77)

PUBLIC FAMILY SPENDING, LABOUR PRODUCTIVITY, INCOME INEQUALITY AND POVERTY GAP IN THE GROUP OF SEVEN COUNTRIES: EMPIRICAL EVIDENCE FROM PANEL DATA

Andy Titus Okwu, Rowland Tochukwu Obiakor, Timothy Chidi Obiwuru , Margret N. Kabuoh, Emeka Okoro Akpa

(1) Department of Economics, Babcock University, Ilishan-Remo, Nigeria
(2) Department of Economics, Babcock University, Ilishan-Remo, Nigeria
(3) Department of Actuarial Science, University of Lagos, Akoka, Nigeria
(4) Department of Business Administration and Marketing, Babcock University, Ilishan-Remo, Nigeria
(5) Department of Economics, Olabisi Onabanjo University, Ago-Iwoye, Nigeria

Okwu Andy Titus
Department of Economics, Babcock University, Ilishan-Remo, Nigeria
okwua@babcock.edu.ng

ABSTRACT

Purpose. *Comparable data on distribution of family income provide reference point for determining economic performance of any country, opportunity to assess effects of income inequality and poverty drivers that are either country- or region-specific. This study analysed the effectiveness of composite indices of public spending on family benefits, labour productivity, macroeconomic performance indicators and moderating factors in reducing income inequality and poverty gap in the Group of Seven (G7) countries from 1980 to 2019.*

Methodology. *The study employed fixed effects Least Squares regression model in panel environment within the framework of empirical econometric methodologies. The composite indices comprised public spending on family benefits in cash and kind, unemployment allowance payments, tax on personal income, labour productivity, harmonised unemployment rate, consumer price index, real GDP growth rate, GDP per capita and per hour worked, fertility rate and trade. After graphical analysis of the data, order of integration was via unit root tests. Hausman test was carried out to choose between fixed and random effects models. Subsequently, parameters of the models were estimated and evaluated for significance at the 0.05 critical level.*

Findings. *The results showed that percentage changes in income inequality and poverty gap indices differed for same percentage change in components of the composite indices. Some variable-specific percentage changes in income inequality and poverty gap were statistically significant, while others were not. However, the overall percentage changes was statistically significant. The paper concluded that while some specific effectiveness of the explanatory variables in reducing income inequality and poverty gap was not significant, their joint effectiveness significantly reduced poverty. Therefore, it is pertinent that family-oriented fiscal policy thrusts should be strengthened and sustained so as to continually reduce income inequality and, ultimately, narrow poverty gap in the countries.*

Limitations. *The study considered the G7 countries for a period of 40 years. The limitations were that the variables considered to influence income inequality and poverty gap in the countries were both exhaustive. Also, the results were conditioned to the method used, and different methods can alternatively be used by other researchers and the results compared with this.*

Originality. *The study is original research paper. It has neither been published in any other peer-reviewed journal not under consideration for publication by any other journal.*

RIC

AndyTitusOkwu,RowlandTochukwuObiakor,TimothyChidiObiwuru,MargretN.Kabuoh,EmekaOkoroAkpa
PUBLIC FAMILY SPENDING, LABOUR PRODUCTIVITY, INCOME INEQUALITY AND POVERTY GAP...   (49 - 77)

1. INTRODUCTION

Considerable reduction in income inequality and poverty, through people-centred fiscal policy thrusts and increased productivity and national output, has been one of the main objectives of governments of most countries all over the world. Recent data show global extreme rate to be 10.7 percent in 2012, 12.4 percent of the world's population lived in extreme poverty in 2013, and that number of people living below the international poverty line of $1.9 daily income decreased by 114 million (Perreira, Lalner and Sanchez-paramo, 2017). World Vision (2018) reports that about 25 percent of the world's population has moved out of extreme poverty since 1990, and less than 10 percent now lives in extreme poverty, with survival based on $1.9 or less in a day.

Historically, official poverty rate differs across the Group of Seven (G7) countries over time. Official Poverty rates in the United States were 14.8, 12.3 and 11.8 percent in 2014, 2017 and 2018 respectively (Semega *et al*, 2019). In Britain, the rates were 22.0 percent and 13.9 percent in 1990 and 2017, respectively (Semega *et al*, 2018). At the end of the 19th Century, more than 25.0 percent of people in Britain lived at subsistence level, or even below (The British Academy, 2018). Poverty rate in Canada was 12.4% in 2008, with plus or minus 1 percent changes from 12.0 percent until 2015. In 2017, poverty rate in the country was 8.7 percent (Statistics Canada, 2020). In France, 2 million people lived in extreme poverty, and recent data indicate that 14 percent of the population (8.8 million people) live in poverty (Komyati, 2019). Germany experienced rising poverty rate from 14.0 percent in 2006 to 14.5 percent in 2010, 15.1 percent in 2011 and 15.2 percent in 2012 (Kreft, 2014; CIA World Factbook, 2019). Accurate number or percentage of the population living in poverty in Japan is difficult to obtain because the country has no official poverty line. However, regular employment status survey in 2006 showed that 8.2 percent of regular Japanese workers lived in poverty. The poverty rates were estimated at 16.1 percent in 2013, with 15.7 percent of the population living in poverty (United Nations, 2017), and 15.7 percent in 2017 (Statistica, 2017). The percentage of Italian poor population increased from 7.9 percent in 2016 to 8.4 percent in 2017, with poverty rates of 14.0 percent in 2016, and 27.7 percent in 2017 (Statistica, 2017; Instituto Nazionale di Statistica, 2018; Lu, 2018; Maio, 2018).

Like poverty rates, threshold of poverty differs across the G7 countries. Poverty thresholds in the countries were: $61,372 in the Unites States in 2017 (Semega *et al*, 2018); 60 percent of the median United Kingdom household income or £25,000 in Britain (The British Academy, 2018); 13.0 percent in Canada, determined as household after-tax income below 50 percent of the median after-tax income (Statistics Canada, 2019); 60 percent of a median revenue in France (Komyati, 2019) and 2,099 euros in Germany, where the trend poverty line is anchored on net income (Kreft, 2014; CIA World Factbook, 2019). Though Japan has no official poverty line, house-

hold mean net-adjusted disposable income of US$23,458, which exceeds the OECD countries' average of US$22,378, is the proxy (Lu, 2018); but at poverty threshold of 1676.54 euros (Instituto Nazionale di Statistica, 2018; Maio, 2018), Italy is below the OECD countries' average.

Comparable data on distribution of household disposable income provide reference point for determining relative position of any country on the global economic development map as the basis to assess the effects of income inequality and factors that are either country- or region-specific. Governments could learn from the success of palliative measures implemented in other countries to reduce income disparities and poverty. Arguably, achieving comparability in the context may be constrained by differences in national practices, especially in terms of concepts of inequality measures such as the GNI coefficient and statistical sources (OECD, 2017). For instance, Heshmati (2004) used World Income Inequality Database (WIID), also known as United Nations University (UNU-WIDER), to provide evidence that suggests that inequality in disposable income is declining over time. But the significant heterogeneity at regional and development levels over time cast serious doubts on Heshmati's evidence. For instance, estimates by the International Labour Organisation (2016) show that more than 300 million people in developed countries lived in poverty in 2012. Moreover, widening inequality has accompanied rising incomes around the world; just as poverty level is on the increase in the developed countries (United Nations, 2016). Therefore, poverty is also the experience in the developed countries.

Though global data suggest that income inequality across households has risen in many countries, some estimates show that it has narrowed across the world as a whole because the incomes of developing and developed regions have been converging (United Nations, 2016). This shows that, despite the growth in income, widening inequality still persists. For instance, although China has remarkably reduced poverty incidence in a short period of time, income inequality still remains a serious challenge, which requires greater effort over longer time horizons (Liu, 2017). Fiscal policies that engender equity in education reduce income inequality by reducing earnings disparity among the population (OECD, 2012).

Sources of income inequality and poverty such as low labour productivity, high fertility rate and proportional income tax may exacerbate poverty gap within and across regional groupings, especially in the event of negative externality economic shock. For example, Philpott (2013) notes that productivity gap between the United Kingdom and other G7 countries widens to largest in 20 Years, with the tendency to increase in the years ahead. Recent data (see the Appendix) show that only the United States ranks among the five most productive countries in the world in 2015 (Johnson, 2017).

Hitherto, substantial studies concentrated on productivity in general, and labour productivity in particular; and just few analysed income inequality and pov-

erty in relation to either economic growth (Charles, 1982; Blank and Blinder, 1986; Blank and Card, 1993; Khan *et al*, 2014; Liu 2017) or labour productivity (Chinbui *et al*, 1993; Cimoli *et al*, 2017) in the context of regional groupings of either developing or developed countries. Therefore, this study examines the effectiveness of family-centred public spending and some other macroeconomic indices in reducing income inequalities and poverty gap in the Group of Seven (G7) countries, with reference to the forty-year period, 1980-2019. The empirical statistical results provide basis for logical conclusion and appropriate policy implications.

The remaining sections of this paper are: literature review, methodology employed for the analysis, presentation of results and discussion of findings, and conclusion and policy implications for the G7 countries.

2. LITERATURE REVIEW

2.1.Conceptual and Theoretical Issues

In the literature, the different indices used to measure income inequality among individuals or households include:

(1) The GINI coefficient index, which shows the extent to which income distribution among households or individuals in an economy deviates from a perfectly equal distribution (OECD, 2018). It compares the cumulative proportions of the population against proportions of income they receive. Its value ranges from 0 (perfect inequality) to 1 (perfect equality). The more the coefficient tends to 1, the less inequality and vice versa.

(2) S80/S20 index, which is the ratio of the average income of the twenty percent richest to the twenty percent poorest people in the population of a given country.

(3) P90/P10 index, determined as the ratio of 10 percent of people with highest income (i.e., upper bound value of the ninth decile) to that of the first decile or 10 percent of people with lowest income.

(4) P90/P50 index, which shows the ratio of the upper bound value or ninety percent of the people with highest income to the median income or fifty percent of the population with middle income level.

(5) P50/P10, which indicates the fifth bound value of the fifth decile or fifty percent of people with median income relative to the upper bound value of the first decile or ten percent of people with median income.

(6) The Palma ratio which shows the share of all income received by ten percent of the people with highest disposable income relative to the share of all income received by forty percent of people with the lowest disposable income among the population of a given country (OECD, 2017). Productivity index is expressed as the ratio of a country's real gross domestic product (RGDP) to the average number of hours (full- and part-term) all employed people work annually (Johnson, 2017). Poverty

gap measures the ratio or proportion by which the mean income of the poor falls below the poverty line. Poverty gap provides an indication of the poverty level in a country, thereby helping to put the country's poverty rate in its proper context (OECD, 2017). As an indicator of poverty level, it is measured for the total population as well as for people within the age range of 18 and 65 years and people over 65 years of age.

Discussions on ethical side of the concept have been considering questions as to whether equality is desirable, fair, and the appropriate level (Sen, 1992). Modern approach to inequality and poverty measurement has definitional elements in the contexts of income based on ethical concepts or other basis for the consideration of distributional comparisons (Deininger, 1996). The concepts are anchored on a set of assumptions that validate any specific ranking principle. In practice, income may be considered as wealth or expenditure. Substantial modern literature explains that income plays the role of a personal index or utility, usually articulated as nominal income normalised by an index of needs (Cowell, 2002). Stiglitz, Sen and Fitoussi (2009) considers income that is adjusted for publicly-provided in-kind transfers to be the most comprehensive concept of household disposable income. This implies that the income of an individual is assumed to fall within some range that gives exact economic definition of income.

Under perfect competition, wage distribution among workers is deemed to reflect marginal revenue products, which varies according the workers' abilities. But the tenets of perfect competition are not consistent with inequality in disposable income (Liu, 2002). Naturally, therefore, this aspect of research study is not suggested by traditional economic theory. Income distribution vector contains the income of a given individual family member and determines the welfare of the family in terms of the income amount available to it. Therefore, welfare of the family is contextualised and suitably classified as either poor or rich class. The amount of money allocated to each class differs; so does the amount which may be invested in social resources (Marx, 1849) or allocated to finance public benefits varies, and family or household income inequality persists. This negates the realism that macroeconomic policies that deviate significantly from poor family-palliative spending usually have far-reaching adverse effects on poor family disposable income OECD (2012). In addition, a wide range of other factors determine family disposable income, some of which are articulated in the perceived linkage channels shown in Figure 1.

Figure 1.: Linkage Channels of Family Earnings and Adjusted Disposable Income
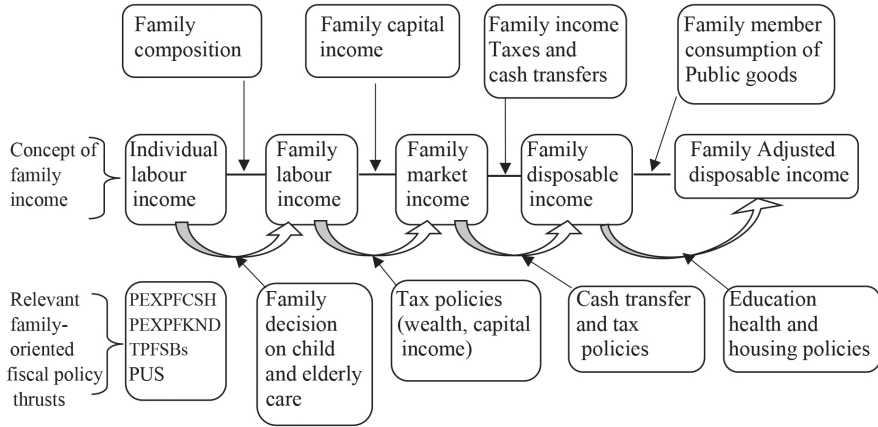
Source: Adapted from OECD (2012) Economic Policy Reforms: Going for Growth.

2.2. Empirical Studies

Available literature suggest paucity of studies related to this aspect of research work in recent times. Based on regional panel data, Blank and Card (1993) investigated the connectivity among poverty, income distribution and growth in nine regions of the United States during 1957-1991 period. The study found heterogeneous effects of poverty on income inequality and growth. The study showed that income inequality and poverty are closely related to conditions in the labour market. Failure of poverty rates to respond to robust GDP growth during the 1980s was due to the combination of slow productivity growth and widening wage inequality. Though the study ignored the determinants of family disposable income, its findings are consistent with some earlier studies (Charles 1977; Charles, 1982; Blank and Blinder, 1986; Slottje, 1989; Ruggles, 1990; Jargowski and Bane, 1991; Levy and Murnane, 1992); and contemporary studies (Blank, 1993; Chinbui *et al*, 1993; Card and Riddell, 1993). In the context of wage inequality, Liu (2002) investigated the net effects of relative deprivation and efficiency wages on labour productivity in Taiwan and South Korea. Based on Taiwanese data from 1979 to 1996 and Korean data from 1993 to 1996, the results indicated that relative deprivation has a highly negative effect on industrial productivity while the effect of efficiency wages is not statistically significant. These underscore the importance of relative deprivation and support the view that manufacturing firms must be concerned with the social legitimacy of their wage distribution, if sustained high labour productivity must be engendered.

The literature provides some empirical evidence which suggest multiple linkage paths between labour productivity increases and poverty reduction. The linkages include price level instability, unemployment, barriers to technology adoption, initial

asset endowments and constraints to market access, all of which inhibit the ability of the poorest to participate in the gains from labour productivity growth (Schneider and Gugerty, 2011). With annual panel data for 32 Sub-Saharan African (SSA) countries, Dhrifi (2014) estimated a simultaneous equation model that catalysed the interrelationship between agriculture labour productivity, technological innovation and poverty. The results showed significant contribution of agricultural productivity to output growth and poverty in the countries. Technological innovation had direct and indirect significant positive impact on poverty. Khan et al. (2014) found that rural development and national income per capita have negative association with poverty and income inequality, but positive association with labour agricultural output growth in Pakistan. Also, FDI has a positive impact on income inequality and poverty. However, external debt is positively related to poverty and income inequality in rural Pakistan. Worthy of note is that health expenditures have positive relationships with poverty and inequality; an indication that the country's health reforms are intrinsically anti-poor. Cimoli et al (2017) examined productivity in the contexts of social expenditure and income distribution in Latin America. The study showed that though social expenditure and direct redistribution are crucial for improving income distribution, and that sustainable equality requires structural change. The authors provided evidence that both institutions and production structure in Latin America fail to foster equality and, thus, engender extremely high levels of inequality during the 1990-2010 period.

Based on data for Korea in the post-World War II period accessed from WIDER inequality database, Heshmati (2004) investigated the linkage between inequality and some macroeconomic variables Ð growth, openness, wages, liberalisation and income redistribution. The results suggested declining income inequality over time both in the levels and development. Cervantes-Godoy and Dewbre (2010) reported that while economic growth has considerable poverty reduction effect, the sector mix of growth matters substantially with growth in agricultural incomes being specifically important for poverty reduction in OECD countries.

A survey by Ramos and Mann (2017) on fiscal approach for inclusive growth as strategy to reduce inequalities found that the G7 countries have been facing lingering period of low growth and persistent lower income of the poorest. The evidence suggests that inequalities widened over the last two decades amid stagnating productivity growth. The emphasised potential of fiscal policy to fundamentally shaping the nexus between productivity and inclusiveness so as to engender income inequality and poverty reduction in the OECD and other countries. Therefore, it recommended, among other things, that the G7 governments need to revisit the tax and benefits system to provide enhanced incentives for labour market participation, encourage the creation of quality jobs in the formal economy, and provide incentives for skills development and lifelong learning. And that the countries should strengthen their social protection systems, particularly in the areas of public spending policies in the direction of poor family benefits.

It is obvious that, except Ramos and Mann (2017), the previous studies left out some relevant key variables in the linkages between poor family-oriented fiscal policy thrusts and labour productivity, on the one hand, and income inequality and poverty gap, on the other hand. For instance, the studies ignored the role of tax on personal income in shaping family adjusted disposable income adjusted. The studies also neglected the relevance of family fertility rate and other macroeconomic considerations such as real GDP growth rate and trade-driven external economic shock. Therefore, the stimulation and innovative point of departure of this current research interest is the inclusion of these relevant key variables omitted by previous studies. This justifies the relevance of the study within the contexts of public family spending, labour productivity, income inequality and poverty gap in the Group of Seven (G7) countries.

3. METHODOLOGY

3.1. Design, Data and Source

We employed Panel EGLS regression model to analyse data for the Group of Seven (G7) countries, namely: The United States of America, Britain or the United Kingdom, Canada, France, Germany, Japan and Italy. The data sets are proxy variables for poor family-oriented fiscal policy thrusts and income inequality incidence and poverty gap in the G7 countries. For the policy variables, we considered public spending on family in-cash and kind, unemployment allowances payments and tax on personal income. GDP per hour worked and labour productivity are the productivity variables, while harmonised unemployment rate, consumer price index, real GDP growth rate, GDP per capita and trade are relevant macroeconomic variables, and fertility rate and trade moderate the influence of the variables on income inequality and poverty gap. The data span 40 years (1980 Ð 2019). Time series values of the data set were extracted from the OECD (2019) family database and World Bank's (2019) World Development Indicators data bank. The sources have been proven to be authoritative and reliable over the years. The variables, descriptions and sources are summarised in Table 1.

Table 1.: Variable, Description, Measurement and Source

Variable	Description	Measurement	Source
IEQTY	Income inequality index is a ratio that approximates the disposable income gap between individuals' or families' disposable income in the population of a country (e.g., an OECD country).	Family disposable income adjusted for publicly-provided in-kind transfers, which is influenced by various factors.	OECD (2017; 2018; 2019)
PG	Poverty gap index is a ratio that shows the extent by which the average income of the poor population in the OECD countries falls below the poverty line. Therefore, it indicates the intensity of poverty in the OECD countries.	Estimate of the depth of poverty obtained by determining extent to which, on the average, income of the poor falls below the poverty line.	OECD (2017; 2019)
Composite Index	**Description, Indicator and Components**	**Measurement**	**Source**
FOFPT	Family-oriented fiscal policy thrust, which consists of poor family-oriented mechanisms aimed at reducing income inequality and poverty gap in the OECD countries.Indicator: Public spending on family transfers (PSFTs). Components: (i) Public spending on families in cash and kind as well as unemployment allowance payment to families, and tax on personal income (TOPI).	Financial support, as % of total government expenditure, exclusively for families and children, exclusive spending to assist families in other areas like education, health and housing.	OECD (2018, 2019)
LPVTY	Labour productivity index. In shows the efficiency of labour in the process of producing national output. Components: GDP per hour worked (GDPPHW), which is the ratio of aggregate output to total number of hours worked. Labour productivity (LP) indicates the efficiency of labour in the producing aggregate national output in the OECD countries.	Values of GDP per capita and GDP per hour worked by labour.	Economic Policy Institute (2018)OECD (2018, 2019)

RIC

AndyTitusOkwu,RowlandTochukwuObiakor,TimothyChidiObiwuru,MargretN.Kabuoh,EmekaOkoroAkpa
PUBLIC FAMILY SPENDING, LABOUR PRODUCTIVITY, INCOME INEQUALITY AND POVERTY GAP… (49 - 77)

Variable	Description	Measurement	Source
MEPI	Macroeconomic performance index. This shows the performance of the aggregate economy which shapes family disposable income. Components: Harmonised unemployment rate (HUR), which shows unemployed family members as a ratio of total labour force who are actively looking for employment in the OECD countries but do not find any. Consumer price index (CPI), showing fluctuations in general price level in the OECD countries. Real GDP growth (rGDPgr), which shows whether or not growth in aggregate output is stable over time. Gross domestic product per capita (GDPPC) indicating per capita population share in the gross domestic product.	HUR: Unemployed family members actively looking for work but cannot find any. CPI: Increases in average price level over time. rGDPgr: Change in real gross domestic product adjusted for inflation.GDPPC: Yearly ratio of national product to population.GDPPHW: Yearly ratio of national product to total hours worked.	World Bank's (2019) WDI OECD (2018, 2019)
MF	Moderating factors. Composite index of factors that moderate influences of poor family-oriented family policy thrust on family disposable income. Components: Fertility rate (FTR), which indicates the rate at which family size changes, and trade to proxy the influence of trade globalisation on poor family-oriented fiscal policy thrust in the OECD countries.	Fertility Rate: Percentage of total births per woman. Trade: exchange of goods and services across international borders as percentage of GDP.	OECD (2018, 2019), Max (2020)

Source: Authors' compilation (2020).

3.2. Specification of Models for Analysis

We specified and estimated two models, as the basis to determine the relative effectiveness of the poor family-focused public spending in reducing the income inequality intensity and poverty gap in the G7 countries. In the models, income inequality and poverty gap are the respective dependent variables while composite indices of poor family-oriented fiscal policy transfers, labour productivity, macroeconomic performance indicators and composite index of the moderator variables are the independent variables. Though most of the series are ratios or percentages, we transformed all into logarithmic form to bring all data to the same baseline and, thus, eliminate idiosyncratic-induced outliers in the models (Wooldridge, 2006). This neutralises country-specific influence across the OECD countries. We recognise that several factors shape the family or household disposable income of the family. Therefore, we specified the aggregated analytic models as follows:

$$lniieqty_{i,t} = \lambda_0 + \lambda_j \sum_{j=1}^{4} fofpt_{i,t} + \lambda_k \sum_{k=5}^{6} lpvty_{i,t} + \lambda_q \sum_{q=7}^{10} mepi_{i,t} + \lambda_r \sum_{r=11}^{12} mf_{i,t} + \mu_{i,t} \qquad (1)$$

$$lnpg_{i,t} = \theta_0 + \theta_j \sum_{j=1}^{4} fofpt_{i,t} + \theta_k \sum_{k=5}^{6} lpvty_{i,t} + \theta_q \sum_{q=7}^{10} mepi_{i,t} + \theta_r \sum_{r=11}^{12} mf_{i,t} + \mu_{i,t} \qquad (2)$$

where *lniieqty* and *lnpg* are indices of income inequality and poverty gap, respectively. $\Sigma fofpt$ is composite index of family-oriented fiscal policy thrusts, consisting of three fiscal policy indicators, namely: public spending on family in cash and kind as well as unemployment allowance payments, which we classified the sum as public spending on family transfers (PSFTs), plus tax on personal income (TOPI). $\Sigma lpvty$ is a composite index of labour productivity, which components are GDP per hour worked (GDPPHW) and labour productivity index (LP). Also, $\Sigma mepi$ is a composite index of macroeconomic performance, which incorporates harmonised unemployment rate (HUR), consumer price index (CPI) or inflation, real GDP growth (rGDPgr) and GDP per capita (GDPPC). Similarly, Σmf is a composite index of intra-country moderating factors across the OECD countries, and the components are fertility rate (FTR) and trade (TRADE). FTR moderates demographic influence on family disposable income while TRADE moderates influence of external sector or exchange globalisation on family disposable income. μ is the error term, and it is assumed to satisfy white noise conditions.

Disaggregating equations (1) and (2), we obtain the following:

$$lniieqty_{i,t} = \lambda_0 + \lambda_1 lnpsfts_{i,t} + \lambda_2 lntopi_{i,t} + \lambda_3 lngdpphw_{i,t} + \lambda_4 lnlp_{i,t} + \lambda_5 lnhur_{i,t} +$$
$$\lambda_6 lncpi_{i,t} + \lambda_7 lnrgdpgr_{i,t} + \lambda_8 lngdppc_{i,t} + \lambda_9 lnftr_{i,t} + \lambda_{10} lntrade_{i,t} + \mu_{i,t} \qquad (3)$$

$$lnpg_{i,t} = \theta_0 + \theta_1 lnpsfts_{i,t} + \theta_2 lntopi_{i,t} + \theta_3 lngdpphw_{i,t} + \theta_4 lnlp_{i,t} + \theta_5 lnhur_{i,t} +$$
$$\theta_6 lncpi_{i,t} + \theta_7 lnrgdpgr_{i,t} + \theta_8 lngdppc_{i,t} + \theta_9 lnftr_{i,t} + \theta_{10} lntrade_{i,t} + \mu_{i,t} \qquad (4)$$

RIC

AndyTitusOkwu,RowlandTochukwuObiakor,TimothyChidiObiwuru,MargretN.Kabuoh,EmekaOkoroAkpa
PUBLIC FAMILY SPENDING, LABOUR PRODUCTIVITY, INCOME INEQUALITY AND POVERTY GAP…   (49 - 77)

where $\boldsymbol{\lambda}_o$ and $\boldsymbol{\theta}_o$ are the intercepts of the models, $\boldsymbol{\lambda}_j$ (*j = 1, 2, 3, …, 10*) and $\boldsymbol{\theta}_k$ (*k = 1, 2, 3, …, 10*) are the respective coefficients of the models to be estimated. The coefficient of each of the independent variables depicts the effect of the associated independent variable on the dependent variable. $\mu_{i,t}$ is the white noise error term. PSFBS, TOPI, HUR, CPI, RGDPgr GDPPC LP, GDPPHW, FTR and TRADE are as earlier defined.

The data set are time series observations on the variables. Therefore, stationary properties of the sets are ascertained so as to ensure stability and time invariance in the estimated relationships. The justification is that a non-stationary time series yields spurious results and, therefore, is inappropriate to generalise for time other than the present as regression tends to yield spurious and inconsistent estimates (Engle and Granger, 1987). The data set is characterised by small number of cross-section units (seven countries) and relatively long period (1980 Ð 2019). We conduct Hausman test to determine the appropriateness of either fixed or random effects model. Based on the result, we employed period fixed effects model to estimate parameters of the model, via panel least squares. This method is considered more suitable than the Generalised Method of Moments (GMM) Estimator which is suitable for dynamic panel data models with fixed effects, large number of cross-sections and short time series (Holtz-Eakin, Newey and Rosen, 1988; Arellano and Bover, 1995; Stock, 2007; William, 2008). We control for time heterogeneous outlier effects across the countries by incorporating period dummy in the estimation process and, thus, control for country-specifics among the OECD countries. This mitigates any unobserved problems of endogeneity among the dependent and independent variables, as well as time outlier effects across the countries.

The *a priori* expectations are that the coefficients of lnTOPI, lnFTR, lnHUR and lnCPI would have positive sign, thereby indicating positive response of income inequality (lnIIEQTY) and poverty gap (PG) to 1 percentage change the variables. On the other hand, the coefficients of lnPSFTs lnRGDPgr, lnGDPPC, lnLPRODVTY, lnGDPPHW and lnTRADE would have negative sign showing that the response of income inequality (lnIIEQTY) and poverty gap (PG) to 1 percentage change in the independent variables would be negative. We evaluated statistical significance of the responses at the conventional 5% critical level. The expectations are summarised in Table 2.

Table 2.: A Priori (Pre-Estimation) Expectations

| Explanatory Variable	Nomenclature	Hypothesis	Expected sign of coefficient
Public spending on family transfers	PSFTs	Income inequality and poverty gap have no significant negative relationship with public spending on family transfers.	Negative (-)
Tax on personal income	TOPI	Income inequality and poverty gap have no significant positive relationship with tax on personal income.	Positive (+)
Fertility rate	FTR	Income inequality and poverty gap have no significant positive relationship with fertility rate.	Positive (+)
Harmonised unemployment rate	HUR	Income inequality and poverty gap have no significant positive relationship with harmonised unemployment rate.	Positive (+)
Consumer price index	CPI	Income inequality and poverty gap have no significant positive relationship with CPI price index.	Positive (+)
Real gross domestic product growth rate	RGDPgr	Income inequality and poverty gap have no significant negative relationship with real domestic product growth rate.	Negative (-)
Gross domestic product per capita	GDPPC	Income inequality and poverty gap have no significant negative relationship with gross domestic product per capita.	Negative (-)
Labour productivity	LP	Income inequality and poverty gap have no significant negative relationship with labour productivity.	Negative (-)
Gross domestic product per hour worked	GDPPHW	Income inequality and poverty gap have no significant negative relationship with gross domestic product per hour worked.	Negative (-)
Trade	TRADE	Income inequality and poverty gap have no significant negative relationship with trade.	Negative (-)

Source: Authors' compilation (2020).

RIC

AndyTitusOkwu, RowlandTochukwuObiakor, TimothyChidiObiwuru, MargretN. Kabuoh, EmekaOkoroAkpa
PUBLIC FAMILY SPENDING, LABOUR PRODUCTIVITY, INCOME INEQUALITY AND POVERTY GAP... (49 - 77)

4. ANALYSIS, RESULTS AND DISCUSSION

4.1. Graphical Analysis of the Data Series

Graphical analysis of income inequality, poverty gap, labour productivity, public spending on families in cash, and unemployment allowance payment during the 1980-2019 period are presented in Figures 2. to 7. respectively.

Figure 2.: Income inequality (1980-2019)

Income inequality in the G7 countries (1980- 2019)
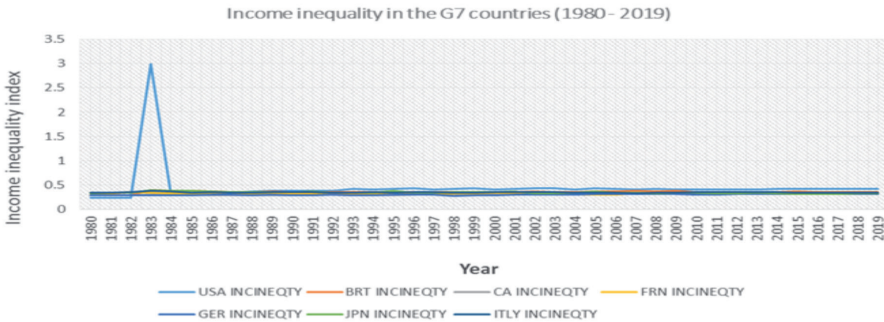
Source: Authors' Analysis (2020).

It is obvious from Figure 2. that the G7 countries experienced narrow inequality income distribution during the period, except the United States whose inequality widened between 1982 and 1984, and peaked at 3 percent.

Figure 3.: Poverty gap (1980-2019)

Poverty gap in the G7 countries (1980- 2019)
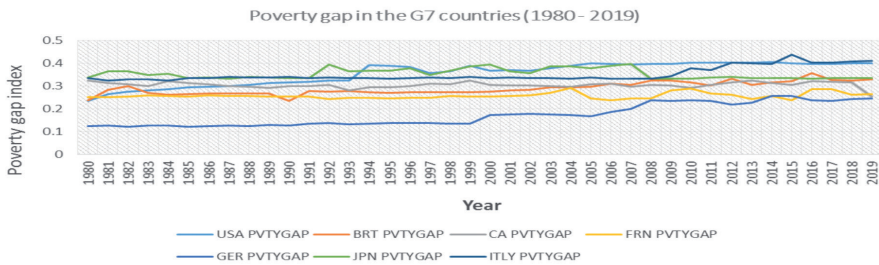
Source: Authors' Analysis (2020).

Figure 3. shows that poverty gap fluctuated slightly upwards in the G7 countries during from 1980 to 2004, except in Italy which experienced slightly decreasing poverty gap from 2000 to 2004. The Figure also shows that, relatively, pverty gap in the G7 countries fluctuated in the years 2005 to 2019.

Figure 4.: Public spending on family in cash (1980-2019)
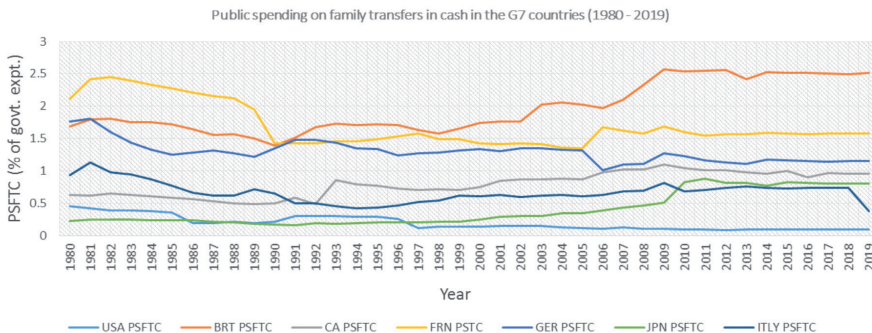
Source: Authors' Analysis (2020).

It is evident from Figure 4. that in the G7 countries, government cash spending on families relativey fluctuating trends during the 1980-2019 period, and that over the period the US and Britain exhibited greater fluctuations (between 1.2 and 2.5 percent of GDP) than other G7 countries.

**Figure 5.:** Public spending on family in kind (1980-2019)
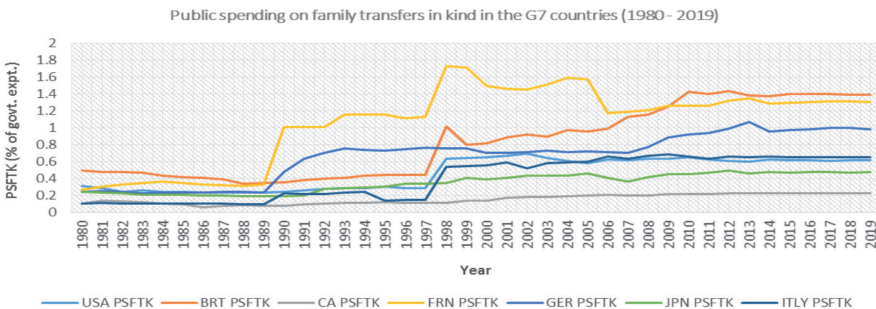
Source: Authors' Analysis (2020).

As shown in Figure 5., public spending (in kind) on families in the G7 countries during the period, was relatively stable during 1980 to 1989, except for Britain and France in the spending msrginally declined marginally. The Figure shows that spending fluctuated considerably during 1990-2019 period, especially in the US, Britain and France.

Figure 6.: Public unemployment spending (1980-2019)
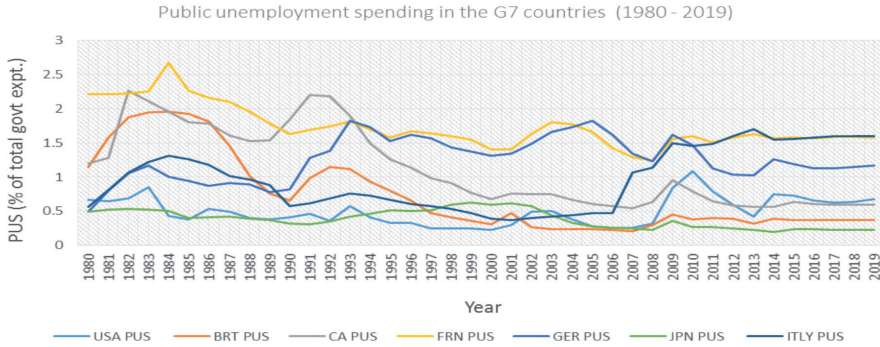
Source: Authors' Analysis (2020).

Figure 6. shows more downward fluctuating trend in time series amounts of government spendings to cousion the adverse effects of unemployment on families of the G7 countries during the period being analysed. Obviously, government unemployment spending fluctuated the most in the US and France; and the least in Britain and Canada.

Figure 7.: Tax on personal income (1980-2019)
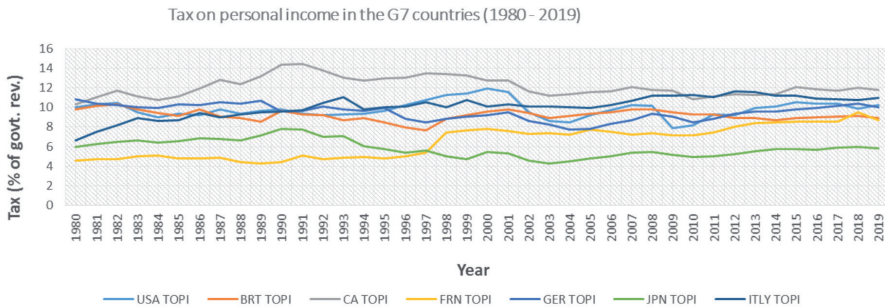
Source: Authors' Analysis (2020).

Figure 7. shows low fluactions in tax on personal income in the G7 countries during the 40-year period. It is manifest from the line graphs that differrent tax-government ratios in the countries during period. For instance, from 1981 to 2009, Canada has greater tax-government ratio while the ratio is lowest France and Japan throughout the period. From 1981 to 1997, the ratio ratio was lower in France than Japan; but reversed between the two countries from 1998 to 2019.

4.2. Time Series Properties of the Data Sets

Stationarity test result of the time series panel data set for unit root test of times series panel data set is presented in Table 3.

Table 3.: Summary of Unit Root Tests for the Variables at First Difference

Variable	Levin Lin and Chu (LLC)Statistic	Probability Value	Order of Integration
Iieqty	-3.55722	0.0002	I(0)
PG	-2.51253	0.0060	I(0)
Fofpt	-1.95151	0.0255	I(0)
Topi	--2.05836	0.0198	I(0)
Ftr	-3.14445	0.0008	I(0)
Hur	-1.85459	0.0318	I(0)
Cpi	-4.48223	0.0000	I(0)
Rgdpgr	-9.98010	0.0000	I(0)
Gdppc	-5.95039	0.0000	I(0)
Lprodvty	-5.86971	0.0000	I(0)
Gdpphw	-6.75291	0.0000	I(0)
Trade	-2.39139	0.0084	I(0)

Source: Authors' computations (2020), using E-Views version 10
Notes: LLC assumes common unit root process. **Significant at the level of 0.05.

Trade moderates the influence of trade globalization.

The results in Table 3. show that panel data series of the variables are integrated of order zero, $I(0)$. Therefore, Panel Engle and Granger Least Squares (EGLS) estimation technique is appropriate to obtain numerical values of parameters of the models.

4.3.Hausmen Test Result

Result of the Hausman test is presented in Table 4.

Table 4.: Summary of Hausman Test Result

Test Summary	Chi-Square Statistic	Chi-Square Degree of Freedom	Probability
Period Random	35.174435	11	0.0002

Note: Effect is considered at the 95% confidence interval or p-value < 0.05 level.
Source: Authors' computations (2020).

The result shows that at 11 degree of freedom, Chi-Square statistic has p-value of 0.0002, which is less that the conventional 0.05 level. Therefore, fixed effects panel model is appropriate.

4.4. Results of the Fixed Effect Panel Least Squares Regression

Estimates of the intercept and coefficients, as well as the relevant evaluation statistics with p-values, for the Panel EGLS regression models specified in equations (1) and (2) are presented in Table 5.

Table 5.: Regression Analysis Results

Dependent Variable in Model 1: lnPG Method: Panel Least Squares Sample: 1980 - 2019 Periods Included: 40 Cross-Sections Included: 7 Total Panel (balanced) Observations: 280			lnIEQTY Dependent Variable in Model 2:	
		Model 1		
Variable	Coefficient (λ_j)	Std. Error	t-Statistic	Prob.
Constant	-16.3560	6.3154	-2.5898	0.0102
lnPSFTs	0.0081	0.0378	02143	0.8305
lnTOPI	0.0452	0.0494	0.9153	0.3610
lnFTR	0.1532	0.0818	1.8742	0.0622
lnHUR	-0.0218	0.0254	-0.8577	0.3920
lnCPI	0.0257	0.0101	2.5441	0.0116
lnRGDPgr	0.0242	0.0160	1.5104	0.1323
lnGDPPC	-0.1503	0.0696	-2.1579	0.0320
lnPRODVTY	-0.0621	0.0534	-1.1637	0.2458
lnGDPPHW	-0.0843	0.1279	-0.6593	0.5104
lnTRADE	-0.2127	0.0591	-3.6027	0.0004
YR2-40	-0.4510	0.1562	-2.8869	0.0043
R-squared = 0.4302 F-Statistic = 2.4573 Adjusted R-squared = 0.3057 Prob(F-statistic) = 0.0000 Durbin-Watson statistic = 2.3193				
		Model 2		
Variable	Coefficient (q_j)	Std. Error	t-Statistic	Prob.
Constant	-2.2467	19.7372	-0.1138	0.9095
lnPSFTs	-0.1336	-0.1336	-1.1314	0.2591
lnTOPI	-0.1232	0.1544	-0.7978	0.4258
lnFTR	1.3651	0.2555	5.3432	0.0000
lnHUR	-0.0679	0.0793	0.8543	0.3938
lnCPI	0.0761	0.0316	2.4068	0.0169
lnRGDPgr	0.0996	0.0502	1.9866	0.0482
lnGDPPC	-0.5270	0.2176	-2.4216	0.0162
lnLPRODVTY	0.4646	0.1668	2.7863	0.0058
lnGDPPHW	0.6408	0.3997	1.6031	0.1103

lnTRADE	−0.4362	0.1845	−2.2635	0.0189
YR2-40	−0.0684	0.4882	−0.1401	0.8887
R-squared = 0.3827 F-Statistic 2.8388 Adjusted R-squared = 0.2479 Prob(F-statistic) 0.0000 Durbin-Watson statistic = 1.0172				

Note: Significance is considered at the 95% confidence interval or p-value < 0.05 level.
Source: Author's computations (2020).

Estimates of Model 1 coefficients provide statistical evidence of varying response of income inequality to dynamics of the independent variables. Some of the coefficients have the sign as expected *a priori* while others are to the contrary. As the sign of the coefficients indicates, the percentage response of income inequality (IIQTY) to percentage change in tax on personal income (TOPI), fertility rate (FTR), consumer price index (CPI), productivity (PRODVTY), gross domestic product growth per hour worked (GDPPHW) and trade (TRADE) is consistent with the expectations, while the response to public spending on family transfers (PSFTs), harmonised unemployment rate (HUR) and real GDP growth rate (RGDPgr) is contrary to the expectations.

The magnitude of the coefficients with the p-values of the coefficient t-statistic values provided statistical evidence that some of the responses are negligible while others are not. The positive response of income inequality (IIEQTY) to public spending on family transfers (PSFTs) is negligible. For 1 percent increase in the composite index of public spending on family transfers (PSFTs), tax on personal income (TOPI), fertility rate (FTR) and real gross domestic product growth (RGDPgr), income inequality (IIEQTY) responds by 0.8, 4.5, 15.3, and 2.4 percent increases respectively, with respective t-statistic p-values of 0.8305, 0.3610, 0.0622 and 0.1323, which prove that the response is negligible or not statistically significant. But the response of income inequality (IIEQTY) to 1 percent increase in consumer price index (CPI) is 2.6 percent increase, which is statistically significant (p-value = 0.0116). The response of IIEQTY to 1 percent increase in harmonised unemployment rate (HUR) is 2.2 percent decrease, which is statistically negligible (p-value = 0.3920). Similarly, IIEQTY responds to 1 percent increase in labour productivity (LPRODVTY) and gross domestic per hour worked (GDPPHW) by 6.2 percent and 8.4 percent decreases, respectively. For 1 percent increase in gross domestic per capita (GDPPC) and trade (TRADE), there are 1.5 percent and 21.3 decreases, respectively, in income inequality (IIEQTY), each of which is statistically significant (p-values = 0.0320 and 0.0004). The negative coefficient, with statistic p-value of 0.0043, shows that percentage decrease in income inequality (IIEQTY) significantly exceeds its percentage increase in the context time shocks.

The F-statistic (3.4573), with p-value of 0.0000, is statistical evidence that joint percentage decrease in income inequality is statistically significant relative to the dynamics of poor family-focused fiscal policy, labour productivity, macroeconomic performance and the moderating factors. Therefore, the composite indices induce significant decrease in income inequality in the OECD countries during the 1980-2019 period. The adjusted coefficient of multiple determination (Adjusted R-

squared = 0.3056) shows that the independent variables considered in the model explain about 31 percent of the total variations in income inequality. This suggests that the unexplained proportion situates outside the model. The Durbin-Watson statistic (DW = 2.3193) indicates that, within the context of Model 1, the explanatory variables are free from the problem of serial order correlation.

The estimates of Model 2 coefficients show that poverty gap responses differently to changes in poor family-centred fiscal policy thrusts and the other explanatory variables in the model. Coefficients of PSFTs, FTR, HUR, CPI, GDPPC and TRADE are appropriately signed, while coefficients of the other variables in the model are not consistent with the *a priori* expectations. Numerical values of the coefficients, with the associated t-statistic p-values provide statistical basis which show that the response of poverty gap (PG) to 1 percent increase in public spending on family transfers (PSFTs), tax on personal income (TOPI), harmonised unemployment rate (HUR) and gross domestic product per hour worked (GDPPHW), respectively, is statistically negligible (i.e., not statistically significant). The evidence is that for 1 percent increase in PSFTs, TOPI, HUR, and GDPPHW, respectively, the percentage decreases in PG are 13.36 (p-statistic p-value = 0.2591), and 12.32 (t-statistic p-value = 0.4258); percentage increases in HUR and GDPPHW, respectively, are 6.78 (p-value = 0.3938) and 64.08 (p-value = 0.1103), respectively. On the other hand, 1 percent increase in CPI, RGDPgr and LPRODVTY induces statistically significant percentage increase in PG of 7.61, 9.96 and 46.46, respectively, with t-statistic p-values of 0.0169, 0.0482 and 0.0058, respectively. The results also provide statistical evidence that 1 percent increae in moderating influence of TRADE induces significant decrease (43.62 percent; t-statistic p-value = 0.0189) in poverty gap. On the other hand, 1 percent increase in the moderating influence of FTR results induces significant increase in PG (36.51 percent; t-statistic p-value = 0.0000). The implication is that possibly, in the G7 countries, moderating influences of influences of fertility rate trade transmit through dynamics of poor family-friendly fiscal policy thrusts, labour productivity and some macroeconomic variables. Negative coefficient (0.0684) of the period dummy, with statistic p-value of 0.0043, provides evidence of significant difference between percentage decrease and increase in poverty gap (GP) resulting period-induced shocks.

The F-statistic value of 2.8388, with p-value of 0.0000, shows that joint percentage decrease in poverty gap (GP) during the 40-year period is statistically significant relative to the mechanisms of poor family-centred fiscal policy, labour productivity, macroeconomic performance and the moderating factors. This means that the explanatory variables significantly reduce poverty gap in the G7 countries. This supports support the finding by Philpott (2013), the view expressed by the United Nations (2016) and the estimates by the International Labour Organisation (ILO, 2016). The value of the adjusted coefficient of determination (Adjusted R-squared = 0.2479) shows that the poor-focused public spending mechanisms, labour productivity metrics and macroeconomic economic factors account for about 25 percent of the total variations in

poverty gap. Therefore, the unexplained proportion of the total variations may be attributable some factors outside the model such as consumption and other life styles of the poor. The Durbin-Watson statistic (DW = 1.9172) shows that the independent variables in the model are free from the problem of serial order correlation.

By comparison, the negative coefficients of PSFTs and TOPI Model 2, which are positive in Model 1, show that poor family-oriented public spending on family transfers and tax on personal income effectively reduce index of income gap, but increase that of income inequality in the countries.

5. SUMMARY, CONCLUSION AND POLICY IMPLICATIONS FOR THE G7 COUNTRIES

This paper employed empirical econometric methodologies to examine the effectiveness of public spending on family transfers, labour productivity, some key macroeconomic performance indices and two moderating variables in reducing income inequality and poverty gap in the Group of Seven (G7) countries. Graphical presentations and fixed effects panel least squares (PLS) estimation techniques are used for the analysis. Estimates of the model coefficients, with the relevant statistics, provided the basis for the evaluation of the effectiveness of the independent variables in bridging income and poverty gaps in the countries. The results show that percentage changes in income inequality and poverty gap indices differ for same percentage change in public spending on family transfers, labour productivity and the macroeconomic performance indices. Some variable-specific percentage changes induced statistically significant percentage changes in income inequality and poverty gap, while others did not. Aggregate percentage change in the explanatory variables induced significant change in in income inequality and poverty gap in the countries. The results also showed that powers of the models are moderately low, and varied in explaining the total variations in incidences of income inequality and poverty gap in the G7 countries during the period.

The paper concludes that, individually, increases in public spending on family transfers reduces poverty gap but increases income inequality in the G7 countries. Similarly, tax on personal income reduces poverty gap but increases the incidence of income inequality. Labour productivity reduces income inequality incidence but increases poverty gap in the countries. Changes in consumer price index (inflation), real gross domestic product growth rate, incidence of income inequality and poverty gap move in same direction. But changes in gross domestic product per capita, income inequality and poverty gap move in opposite directions. Poverty gap and gross domestic product per hour worked change in the same direction while income inequality change in the opposite direction.

The findings, which are subsumed in the conclusion, present certain policy implications for the G7 countries. First, poor family-centred public spending mecha-

nisms should be sustained with a view to continually narrowing poverty gap in the countries. By implication, therefore, increasing public spending on family benefits in-kind and in-cash as well as unemployment allowance payments should be in-built in poor family-focused benefits expenditures. To mitigate the increases in income inequality induced by poor family-oriented public spending and tax on personal income, buffers should by in-built in the tax structure to alleviate the income inequality-escalating effect. Further, progressive tax regime should be implemented, and substantial proportion of resultant tax revenue be channeled towards increasing poor family-beneficial public spending. Alternatively, labour productivity-enhancing investment, such as investment in functional education, training and research should be considered. This would empower the poor and increase their income earning capacity and, thus, improve their financial status. It would also reflect in increased real gross domestic product both per capita and hour worked and, ultimately, reduce poverty gap in the countries. Hence, incorporating these in the fiscal and other macroeconomic policy frameworks have inherent potentials for broader effectiveness in reducing the incidences of income inequality and poverty gap in the G7 countries.

The data analysed in this paper are for the G7 countries. Therefore, the paper suggests that further studies should consider similar and or related studies for larger sample of the OECD countries and other geographical regions in the developed and developing countries as well as the emerging market economies.

Authors Contributions

Each of the co-authors participated actively in sourcing and extracting data sets used for analysis in this paper. Each author also participated equally parts in the review of literature done in section two. The third and fifth co-authors wrote the introduction (section one) and conceptual issues (in section two). All authors made equal contributions to the theoretical considerations (in section two) of the paper. The authors articulated the methodology in section three; implemented the econometric methodological analysis, discussion of the results, conclusion and policy implications in sections four and five.

Statement of Public Interest

Many studies have provided empirical evidence of dwindling income incidence and poverty reducing effects of fiscal, economic and social policy thrusts in countries across the world, particularly in the developed nations. This is confirmed for the G7 countries analysed in this paper. Therefore, the authors are of the view that appropriately redesigning and fine-tuning the mechanisms of public spending on households, and engendering commensurate labour productivity are matters of urgency within and among the countries for enhanced reductions in the widening incidences of income inequality and poverty gap.

REFERENCES

Arellano, M., and Bover, S., Dynamic Panel Data and Simultaneous Reverse Causation Bias. *Journal of Econometrics*, *23*(6), (1995): 250-261.

Blank, R. M., Why were Poverty Rates So High in the 1980s? In Papadimitriou D. B. and Wolff E. N. (eds.): In Poverty and Prosperity in the USA in the Late Twentieth Century. New York: St. Martin's Press, 1993.

Blank, R. M. and Card, D., Poverty, Income Distribution and Growth: Are They Still Connected? *Brookings Papers on Economic Activity*, *1993*(2), (1993):285-339.

Economic Policy Institute (EPI), The Productivity-Pay Gap. (2018). https://www.epi.org/productivity-pay-gap/ Accessed on 30 August 2018.

Blank, R. M. and Blinder, A. S., Macroeconomics, Income Distribution, and Poverty. In Danziger, S. H. and Weinberg D. H. (eds.) Fighting Poverty: What Works and What Doesn't. Cambridge, Mass.: Harvard University Press, 1986.

Card, D. and Riddell, W. C., A Comparative Analysis of Unemployment in the United States and Canada. In Card D. and Freeman R. B. (Eds.). Small Differences that Matter: Labour Markets and Income Maintenance in Canada and the United States. Chicago: University of Chicago Press, 1993.

Cervantes-Godoy, D. and Dewbre, J., Economic Importance of Agriculture for Poverty Reduction. OECD Food, Agriculture and Fisheries Working Papers, No. 23, OECD Publishing, (2010), doi: 10.1787/5kmmv9s20944-en.

Charles, M. A., The Two Wars against Poverty: Economic Growth and the Great Society. *Public Interest*, 69, (1982): 3-16.

Charles, B. M., Cyclical Sensitivity of Aggregate Income Inequality. *Review of Economics and Statistics*, 59(1), (1977): 56-66.

Chinbui, J., Murphy, K. M. and Pierce, B., Wage Inequality and the Rise in Returns to Skill. *Journal of Political Economy*, 101(3), (1993): 410-442.

CIA World Factbook., Poverty in Germany Hits New High (2019). Retrieved from https://www.indexmundi.com/germany/population_below_poverty_line.html on 06 April 2020.

Cimoli, M., Porcile, G. Neto, A. M. and Sossdorf, F., Productivity, Social Expenditure and Income Distribution in Latin America, *Brazilian Journal of Political Economy*, 37(4), (2017)

Cowell, F., The Economics of Poverty and Inequality: Introduction, (2002). www.darp.Ise.ac.uk/papersdb/Cowell_(Elgar_03).pdf. Accessed on 07 September 2018: 660-679.

Deininger, K. and Squire, L., A New Data Set Measuring Income Inequality, *World Bank Economic Review*, 10(3), (1996): 565-591.

Dhrifi, A., Agricultural Productivity and Poverty Alleviation: What Role for Technological Innovation. *Journal of Economic and Social Studies*, 4(1), (2014): 139-158.

Economic Policy Institute (EPI)., The Productivity-Pay Gap, (2018). Retrieved from https://www.epi.org/productivity-pay-gap/ on 25 August 2018.

Engle, R. and Granger, C., Co-Integration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55, (1987): 251-276.

Heshmati, A., Growth, Inequality and Poverty Relationships, (2004). MTT Economic Research, Agrifood Research Finland. Discussion Papers 2004/16.

Holtz-Eakin, S., Newey, M. and Rosen, P., Generalised Method of Moments (GMM) Estimator for Dynamic Models of Panel Data. *Quantitative and Empirical Economics Journal*, 25(1), (1988): 172-190.

International Labour Organization (ILO)., Key Indicators of the Labour Market, (2016), 9th Edition. Retrieved from www.ilo.org/kilm on 5 September 2018.

Instituto Nazionale di Statistica (ISTAT)., Poverty in Italy, (2018), Retrieved from https://www.istat.it/en/archivio/217653 on 06 April 2020.

Jargowski, P. A. and Bane, M. J., Ghetto Poverty in the United States, 1970-1980. In Jencks C. and Peterson P. E. (eds.): The Urban Underclass. Washington: Brookings, 1991.

Johnson, D., These are the Most Productive Countries in the World, (2017).

Retrieved from http://time.com/4621185/worker-productivity-countries/ on 07 September 2018.

Khan, M. A., Khan, M. Z., Zaman, K. and Khan, A., Poverty-Growth-Inequality Triangular Component Analysis: With an Empirical Illustration Using Pakistan's Data. *International Journal of Rural Management*, 10(1), (2014): 69-86.

Komyati A., Top 10 Facts about Poverty in France, (2019). Retrieved from https://borgenproject.org/top-10-facts-about-poverty-in-france/ on 06 April 2020.

Kreft, K., Poverty in Germany. World Socialist Web Site, (2014). Retrieved from https://www.wsws.org/en/articles/2014/01/06/germ-j06.html on 08 April 2020.

Levy, F. and Murnane, R. J., U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations. *Journal of Economic Literature*, 30(3), (1992): 1333-1381.

Liu, M., Inclusive Growth and Poverty Eradication Policies in China. Paper prepared for eradicating poverty to achieve sustainable development for all. Division for Social Policy and Development, Department of Economic and Social Affairs. New York: United Nations Headquarters, 2017.

Liu, J., Does Wage Inequality Affect Labour Productivity? Some Evidence from Manufacturing Industries of Taiwan and South Korea. *Asia Pacific Management Review*, 7(4), (2002): 449-476.

Lu, J., World Update: Top 10 Facts about Poverty in Japan, (2018). Retrieved from https://borgenproject.org/top-10-facts-about-poverty-in-japan/ on 07 April 2020.

Maio, L. D., Poverty in Italy at worst for 12 years. A Speech Delivered at the Italian Business Association Confcommercio meeting in Rome, Italy, June 7, 2018. https://www.reuters.com/article/us-italy-politics-poverty/poverty-in-italy-at-worst-for-12-years-new-government-vows-action-idUSKBN1JM2GM, (2018). Retrieved on 08 April 2020.

Max, R., Fertility Rate, (2020). Retrieved from https://ourworldindata.org/fertility-rate on 3 April 2020.

Marx, K., Wages Đ Labour and Capital. New York: International Publishers, 1933, 1849.

OECD., Reducing income inequality while boosting economic growth: Can it be done? In Economic Policy Reforms: Going for Growth, (2012): 181-202. Retrieved from ww.oecd.org/economy/labour/49421421.pdf on 30 March 2020.

OECD., Public Spending on Family Benefits, (2012). Retrieved from https://www.familie.at/dl/qLKmJKJk0KJqx4NJK/OECD on 3 April 2020.

OECD., Income Inequality Indicator, (2017). Retrieved from http://dx.doi.org/10.1787/459aa7f1-en on 02 September 2018.

OECD., Poverty Gap Indicator, (2017). Retrieved from http://dx.doi.org/ 10.1787/349eb41b-en on 02 September 2018.

OECD., Income Distribution: Inequality, (2017). Retrieved from http://dx.doi.org/10.1787/data-00199-en on 02 September 2018.

OECD., Income Distribution: Poverty, (2017). Retrieved from http://dx.doi.org/10.1787/data-00200-en on 02 September 2018.

OECD., Labour Productivity and Utilisation, (2017). Retrieved from http://dx.doi.org/10.1787/data-00200-en on 02 September 2018.

OECD., Harmonised Unemployment Rate, (2018). Retrieved from https://www.oecd-ilibrary.org/search ?value1=harmonised+unemployment+rateandoption1=quicksearchandfacetOptions=51andfacetNames= pub_igoId_facetandoperator51=ANDandoption51=pub_igoId_facetandvalue51=%27igo%2Foecd%27and publisherId=%2Fcontent%2Fig0%2FoecdandsearchType=quick on 3 April 2020.

OECD., Income Inequality, (2019). Retrieved from https://www.oecd-ilibrary.org/social-issues-migration-health/income-inequality/indicator/english_459aa7f1-en on 3 April 2020.

OECD., Family Database, (2019). Retrieved from www.oecd.org/social/family/database, on 8 February 2020.

Ferreira, F., Lakner, C and Sanchez-Paramo, C., The 2017 Global Poverty Update from the World Bank, (2017). World Bank Blogs. https://blogs.worldbank.org/developmenttalk/2017-global-poverty-update-world-bank. Retrieved on 09 April 2020.

Philpott, J., Productivity Gap between UK and other G7 Countries Widens to Largest in 20 Years. The Guardian International Edition, (2013). Retrieved from https://www.theguardian.com/business/2013/ sep/18/productivity-gap-uk-g7-output on 31 August 2018.

Ramos, G. and Mann, C., A Fiscal Approach for Inclusive Growth in G7 Countries, (2017). Retrieved from www.oecd.org/Tax-tax-policy-analysis on 05 September 2018.

Ruggles, P., Drawing the Line: Alternate Poverty Measures and their Implication for Public Policy. Washington: The Urban Institute Press, 1990.

Schneider, K. and Gugerty, M. K., Agricultural Productivity and Poverty Reduction: Linkages and Pathways. The Evans School Review, 1(1), (Spring 2011): 56-74.

Semega, J., Fontenot, K. R. and Kollar, M. A., What is the Current Poverty Rate in the United States? Census Bureau, Centre for Poverty Research, (2018). Retrieved from https://poverty.ucdavis.edu/faq/ what-current-poverty-rate-united-states on 08 April 2020.

Semega, J. Fontenot, K. R. and Kollar, M., Income and Poverty in the United States, 2018. https://www. census.gov/library/publications/2018/demo/p60-263.html

Sen, A., Inequality Re-Examined. New York, Russell Sage Foundation: Oxford, Clarendon Press, 1992.

Slottje, D. J., The Structure of Earnings and the Measurement of Income Inequality in the U.S. Amsterdam: North-Holland, 1989.

Statistica., Poverty Rates in OECD countries as of 2017. Retrieved from https://www.statista.com/ statistics/233910/poverty-rates-in-oecd-countries/ on 09 April 2020.

Statistics Canada., Persons Living below Canada's Official Poverty Line (Market Basket Measure) 2013-

2017, (2019). https://www150.statcan.gc.ca/n1/daily-quotidien/190226/t002b-eng.htm. Retrieved on 06 April 2020.

Statistics Canada., Dimensions of Poverty Hub, (2020). Retrieved from https://www.statcan.gc.ca/eng/topics-start/poverty on 06 April 2020.

Stiglitz, J., Sen, A. and Fitoussi, J. P., Report by the Commission on the Measurement of Economic Performance and Social Progress, (2009). Commission on the Measurement of Economic Performance and Social Progress.

Stock, J. H. and Watson, M. W., Introduction to Econometrics. 2nd ed. Boston: Pearson Addison Wesley, 2007.

The British Academy., How Poverty in Modern Britain Echoes the Past, (2018). Retrieved from www.thebritishacademy.ac.uk on 07 April 2020.

United Nations., Human Development Report 2016: Human Development for Everyone, United Nations Development Programme, (2016). https://www.un.org/human-development-report-2016.pfd.

United Nations., World Economic Situation and Prospects: October 2017 Briefing, No. 107, (2017). Retrieved from https://www.un.org/development/desa/dpad/publication/world-economic-situation-and-prospects-october-2017-briefing-no-107/ on 09 April 2020.

William, H. G., Econometric Analysis. 6th ed., New Jersey: Upper Saddle River, Prentice Hall, 2008

Wooldridge, J. M., Introductory Econometrics. 3rd. ed., Thomson South-West, 2006.

World Vision., Global Poverty: Facts, FAQs, and How to Help, (2018). Retrieved from https://www.worldvision.org/sponsorship-news-stories/global-poverty-facts.

World Bank., World Development Indicators, (2019). Retrieved from databank.worldbank.org/reports.aspx?source=world-development-indicators on 25 February 2020.

APPENDIX: MOST PRODUCTIVE COUNTRIES (2015)

Rank	Country	GDP per hour Worked	Employed Population	GDP (USD)	Average work week (hrs)
1	Luxembourg	$ 93.4	405,600	$57b	29
2	Ireland	$ 87.3	1,989,400	$302b	33.5
3	Norway	$ 81.3	2,753,000	$318b	27.3
4	Belgium	$ 69.7	4,601,200	$498b	29.8
5	United States*	$ 68.3	151,000,000	$18,037b	33.6
6	Denmark	$ 67.6	2,829,000	$270b	27.2
7	France*	$ 65.6	27,523,000	$2,648b	28.2
8	Germany*	$ 65.5	43,057,000	$3,857b	26.3
9	Netherlands	$ 65.4	8,792,000	$818b	27.4
10	Switzerland	$ 64.2	4,962,600	$506b	30.6
11	Austria	$ 60.2	4,290,700	$415b	30.9
12	Sweden	$ 59.1	4,809,700	$458b	31
13	Finland	$ 54.8	2,497,400	$225b	31.6
14	Australia	$ 54.6	11,860,000	$1,101b	32.7
15	United Kingdom*	$ 52.1	31,293,000	$2,701b	31.9
16	Italy*	$ 51.9	24,476,100	$2,191b	33.1
17	Spain	$ 51	18,490,800	$1,594b	32.5
18	Canada*	$ 50.9	18,285,700	$1,589b	32.8
19	Iceland	$ 45.1	183,700	$16b	36.1
20	Japan*	$ 41.9	65,801,200	$4,741b	33.1
21	New Zealand	$ 40.9	2,360,600	$170b	33.8
22	Slovenia	$ 40.4	941,500	$64b	32.5
23	Israel	$ 40.3	3,947,100	$300b	36.3
24	Slovak Republic	$ 39.7	2,267,100	$158b	33.7
25	Czech Republic	$ 38	5,179,700	$346b	33.8
26	Portugal	$ 35.4	4,575,800	$303b	35.9
27	Greece	$ 35.3	4,019,800	$288b	39.1
28	Hungary	$ 33.5	4,327,500	$254b	33.6
29	Lithuania	$ 32.6	1,334,700	$81b	35.8
30	Korea	$ 31.9	25,936,300	$1,749b	40.7
31	Estonia	$ 31.6	622,900	$36b	35.6
32	Latvia	$ 28.3	887,900	$48b	36.7
33	Chile	$ 25.9	7,802,200	$402b	38.2
34	Russia	$ 25.1	72,187,700	$3,580b	38
35	Mexico	$ 20.3	50,262,900	$2,188b	41.2

Note: *G7 countries.
Source: https://stats.oecd.org/Index.aspx?DataSetCode=PDB_LV