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Causality Between Financial Development, Economic Growth, and Income Inequality in EU Countries

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ABSTRACT

This study investigates the causality between financial development, economic growth, and income inequality using panel data for 23 European Union countries over the period 1987-2017. Various proxies of financial development are chosen to represent the depth, efficiency, and stability of the banking system and stock markets. For the empirical analysis, the study performs the Granger non-causality test in heterogeneous panels. The findings are contradictory and sensitive to the measures of financial development. Most importantly, the results reveal a one-way causality from financial development to economic growth when private credit, stock market capitalization, net margin interest rate, and Z-score are chosen as financial development indicators. In addition, a two-way causality exists between bank assets, liquid liabilities, non-performing loans, and economic growth, and a one-way causality from economic growth to value traded and turnover ratio. However, the results show no causality between stock price volatility and economic growth. The results indicate a one-way causality running from income inequality to economic growth. Finally, a one-way causality runs from income inequality to financial development for most measures of financial development except for a one-way causality running from private credit to income inequality, a two-way causality between bank assets and inequality, and an absence of causality between income inequality and turnover ratio, Z-score and stock price volatility.

1. Introduction

The link between financial development, economic growth, and income inequality has attracted academic interest over the past years.

The direction of causality between financial development and economic growth has been extensively investigated in the literature. Better financial functions provided by the financial system can lead to economic growth through diversification and concentration of risk, accumulation of physical capital, capital mobilization, and increased productivity and

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technology. Several empirical studies support the supply-leading hypothesis that the development of the financial system leads to economic growth (Schumpeter, 1912; Christopoulos & Tsionas, 2004; Abu-Bader & Abu-Qarn, 2008; Cavenaile et al., 2014, Küçüksakarya, 2021). On the contrary, several studies confirm the demand-following hypothesis. In other words, financial development follows economic growth since improving living standards leads to expanding demand for financial services (Robinson, 1952; Zang & Kim, 2007; Bist, 2018). More recently, two additional hypotheses have been identified in the literature. The hypothesis of feedback causality, meaning the existence of two-way causality between financial development and economic growth (Demetriades & Hussein, 1996; Apergis et al., 2007; Al-Yousif, 2002; Calderón & Liu, 2003; Kar et al., 2011; Swamy & Dharani, 2018, Fuinhas et al., 2020; Nguyen et al., 2021). Finally, the neutrality hypothesis supposes the absence of causality between financial and economic growth and the role of finance in economic growth is overemphasized (Lucas, 1988; Shan et al., 2001; Hsueh et al., 2013; Stolbov, 2017). In addition, some studies provide mixed results for the direction of causality between financial development and economic growth. More specifically, Pradhan et al. (2018) examined the relationship between financial development, innovation and growth, and found a unidirectional causality from banking system development to economic growth, and a bidirectional causality between financial system development and economic growth in 49 European countries during the period 1961-2014. Aimer (2021) used panel data for the period 1980 - 2017 in Upper-Middle-Income countries and found a unidirectional causality from economic growth to financial development in Jordan, Morocco, Belize, Botswana, China, Guatemala, Paraguay, Peru, and Thailand, a unidirectional causality from financial development to growth in Algeria, Egypt, Saudi Arabia, Dominican Republic, Malaysia, South Africa and Turkey, and absence of causality in Oman, Tunisia, Brazil, Mauritius and Mexico. Mtar and Belazreg (2021) investigated the causality relationships between innovation, financial development, and economic growth for 27 OECD countries covering the period 2001–2016, and the results confirmed a unidirectional causality from economic growth to financial development and absence of causality between financial development and economic growth.

The relationship between economic growth and income inequality is rooted in Kuznets's contribution (1955). Economic growth and inequality are linked with an inverted U-shaped form, where income inequality widens at the first stage of development and decreases later. There are few studies in the empirical literature that have investigated the causal relationship between economic growth and income inequality. Assane and Grammy (2003) argue that there is one-way causality running from economic growth to inequality. Pérez-Moreno (2009) analyzed the causal relationship in 17 Spanish regions from 1970 to 2000 and showed a one-way causality from economic growth to inequality. Risso and Sanchez-Carrera (2012) found a one-way causality from inequality to economic growth in China. Risso et al. (2013) show one-way causality from GDP per capita to the Gini index. Jihène and Ghazi (2013) investigated the relationship between 9 countries in the Middle East and North Africa (MENA) from 1960 to 2011 and resulting in a two-way causality in Tunisia, Iran, Israel, and Morocco and a reverse causality from economic growth to income inequality in Mauritania, Tunisia, and Turkey. Andrade et al. (2014) and Amri (2018) confirmed a one-way causality from income inequality to economic growth. Younsi and Bechtini (2018) examined the causal relationship between economic growth, financial growth, and income inequality for the BRICS countries covering 1995 – 2015 and suggested a one-way causality from the economic growth to income inequality. Brida et al. (2018) found a unidirectional running from economic growth to inequality in Uruguay for the period 1986 to 2014. Vo et al. (2019) investigated the relationship between 1960 and 2014 and showed a two-way causality between income inequality and economic growth. Aremo and Abiodun (2020) studied the causality direction between fiscal policy, income inequality and economic growth in twenty-six Sub-Saharan African countries

over the period 1996-2016 and pointed out a unidirectional causality from economic growth to income inequality in upper middle-income countries. Wolde et al. (2021) detected a unidirectional causality from economic growth to income inequality in Ethiopia during the period 1980-2017.

Few studies have examined the direction of causality between financial development and income inequality. Gimet and Lagoarde-Segot (2011) and Shahbaz et al. (2015) argued that financial development Granger causes income inequality. Sehrawat and Giri (2016) studied the relationship between financial development and rural-urban inequality in six South Asian Association of Regional Cooperation (SAARC) countries during the period 1986-2012, and the results show that economic growth and financial development cause rural-urban inequality. Azam and Raza (2018) found a unidirectional causal relationship running from financial development to income inequality and no causal relationship between economic growth income inequality in ASEAN-5 countries over the period 1989-2013.

Using time-series or panel data, researchers examine the causality between financial development, economic growth, and income inequality and carry out advanced econometric methods. However, the results remain in conflict and are arising the need to investigate further the nexus between financial development-economic growth, economic growth-inequality, and finance-inequality (Apergis et al., 2007; Gimet & Lagoarde-Segot, 2011; Vo et al., 2019). Therefore, this study aims to find new evidence for the direction of causality between financial development, economic growth, and income inequality using balanced panel data for 23 European Union countries covering the period 1987-2017. The main contribution of this study is the choice of different characteristics of the banking system and stock market as measures of financial development to explore the causality.

The rest of the paper is organized as follows: Section 2 provides a brief literature review, Section 3 contains data and methodology, Section 4 presents the results, and finally, Section 5 provides the conclusions.

2. Materials and Methods

For the empirical analysis of the causality between financial development, economic growth, and income inequality, this study uses a balanced panel dataset based on annual data of 23 European Union countries, namely, Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Sweden, over the period from 1987 to 2017. The data of financial development, economic growth, and income inequality were collected from Global Financial Development Database (GFDD, 2019), World Development Indicators of the World Bank, and the Standardized World Income Inequality Database derived by Solt (2019), respectively. The selection of countries and time-period was restricted by the availability of data, but also with a perspective to include years from the old European Union members joining, the further enlargement, the financial and economic crisis in 2008-2009 and, the post-crisis era.

Several proxies of financial development are used to represent the depth, efficiency, and stability of the banking system and stock markets.

In particular, banking development indicators are the following:

- private credit (PRV) is the financial resources provided to the private sector by domestic money banks as a share of GDP

- bank asset (BAS) equal to the total assets held by deposit money banks as a share of the sum of deposit money bank and Central Bank claims on domestic nonfinancial real sector
- liquid liabilities (LLY), which is the ratio of liquid liabilities to GDP
- net margin interest rate (INT), which is the accounting value of a bank's net interest revenue as a share of its average interest-bearing assets
- Z-score (ZSC) which is the probability of default of a country's commercial banking system
- non-performing loans (NPL) are equal to the ratio of defaulting loans (payments of interest and principal past due by 90 days or more) to total gross loans

Moreover, stock markets development measures are:

- stock market capitalization (SMC) is the total value of all listed shares in a stock market as a percentage of GDP
- value traded (VTR) as the total value of all traded shares in a stock market exchange as a percentage of GDP
- turnover ratio (TOR) equal to the total value of shares traded during the period divided by the average market capitalization for the period
- stock price volatility (SPV) is the average of the 360-day volatility of the national stock market index.

The economic growth (GDP) is measured by the annual percentage growth rate of GDP per capita based on constant 2010 U.S. dollars, and income inequality is measured by the Gini index (GIN) as the estimate of disposable income after tax and after transfers. All variables are transformed into natural logarithms. Table 1 presents the descriptive statistics of the variables.

Table 1.
Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
PRV	4.129296	0.6409722	1.44667	5.361999
BAS	4.547039	0.1260583	3.602529	4.780094
LLY	4.243161	0.6541575	1.306106	6.844519
SMC	3.219709	1.235333	-3.652779	5.510076
VTR	1.907194	1.90958	-8.04719	5.50723
INT	0.7619319	0.6975175	-2.07482	3.019122
TOR	3.2989	1.38236	-2.033727	6.65067
ZSC	2.284908	0.6578909	-4.092347	3.862272
NPL	1.48099	1.144822	-2.302585	8.614151
SPV	3.003473	0.3605328	1.846653	4.116339
GDP	0.0130052	0.1344802	-1.568501	0.9231613
GIN	3.331925	0.1327413	2.99072	3.595099

Notes: N=23 and T=31

This study implements the Granger non-causality test in heterogeneous panel proposed by Dumitrescu and Hurlin (2012) to examine the causality between financial development, economic growth, and income inequality. The test is based on a vector autoregressive model (VAR) with constant time dimensions and different cross-section individuals and has the following form:

$$y_{i,t} = \alpha_i + \sum_{k=1}^{K} \gamma_{ik} y_{i,t-k} + \sum_{k=1}^{K} \beta_{ik} x_{i,t-k} + \varepsilon_{i,t} \;\; with\; i = 1, \dots, N \; and \; t = 1, .., T \qquad (1)$$

where $x_{i,t}$ and $y_{i,t}$ are the observations of two stationary variables for individual i in the period t. The lag order K is identical for all cross-section units and the panel must be balanced.

The null hypothesis assumes no existence of causality relationship from x to y for all individuals and is defines as:

$$H_0: \beta_{i1} = \cdots = \beta_{iK} \quad \forall \; i = 1, \ldots, N$$

against the alternative hypothesis that assumes a causal relationship running from x to y for a subgroup of N−N1 individuals and is defined as:

$$H_1: \beta_{i1} = \cdots = \beta_{iK} \quad \forall \; i = 1, \ldots, N_1$$

$$\beta_{i1} \neq 0 \; or \ldots or \; \beta_{iK} \neq 0 \quad \forall \; i = N_1 + 1, \ldots, N$$

where $N_1 \in [0, N-1]$ is unknown but satisfies the condition $0 \leq N_1/N < 1$.

The test statistic is based on the average of the individual Wald statistics of Granger non causality across the individuals and is computed as:

$$\bar{W} = \frac{1}{N}\sum_{i=1}^{N} W_i \tag{2}$$

Under the assumption that the Wald statistics W_i are independently and identically distributed across individuals the average Wald statistic is shown to converge sequentially to a standard normal distribution

$$\bar{Z}_{N,T}^{HNC} = \sqrt{\frac{N}{2K}}\left(\bar{W}_{N,T}^{HNC} - K\right) \; T, N \to \infty, N(0,1) \tag{3}$$

In this study, the models are specified as:

$$\Delta GDP_{i,t} = \alpha_{1i} + \sum_{k=1}^{K} \gamma_{11ik} \Delta GDP_{i,t-k} + \sum_{k=1}^{K} \beta_{12ik} \Delta FINANCE_{i,t-k} + \varepsilon_{1i,t} \tag{4}$$

$$\Delta GDP_{i,t} = \alpha_{2i} + \sum_{k=1}^{K} \gamma_{21ik} \Delta GDP_{i,t-k} + \sum_{k=1}^{K} \beta_{22ik} \Delta GIN_{i,t-k} + \varepsilon_{2i,t} \tag{5}$$

$$\Delta FINANCE_{i,t} = \alpha_{3i} + \sum_{k=1}^{K} \gamma_{31ik} \Delta FINANCE_{i,t-k} + \sum_{k=1}^{K} \beta_{32ik} \Delta GIN_{i,t-k} + \varepsilon_{3i,t} \tag{6}$$

where FINANCE represents the measures of financial development, GDP is the economic growth, GIN is the income inequality, α_i is the constant term, β_{ik} and γ_{ik} are coefficients of variables, $\varepsilon_{i,t}$ is the error term and k is the optimum lag length, selected through Schwarz Information Criteria (BIC).

3. Results

An essential assumption of the Granger non-causality test by Dumitrescu and Hurlin (2012) requires that the variables of financial development, economic growth, and income inequality must be stationary. The presence of cross-sectional dependence should be considered when panel data are used. Consequently, this study employs the Breusch and Pagan (1980) LM test, the Pesaran (2004) CD test, and the Pesaran et al. (2008) bias-adjusted LM test. The results of the cross-sectional dependency test are reported in Table 3. The null hypothesis of cross-sectional independence is rejected for all estimated models since p-values are less than a 1%

significance level. In other words, a shock can be transmitted from one country to influence other countries due to financial and economic integration between European Union countries.

Table 3.
Cross-sectional dependence

	LM	LM adj*	LM CD*
Dependent variable: GDP			
PRV	1392***	156.1***	24.94***
BAS	1534***	175.8***	26.6***
LLY	1319***	145.8***	24.38***
SMC	1652***	191.2***	26.05***
VTR	1673***	194.2***	26.91***
INT	1565***	180.2***	26.93***
TOR	1556***	179.1***	27.15***
ZSC	1513***	173.5***	24.68***
NPL	1617***	187.8***	26.14***
SPV	1336***	148.4***	21.68***
GIN	1535***	175.7***	27.44***
Dependent variable: GIN			
PRV	1516***	173.2***	14.02***
BAS	1650***	191.9***	13.2***
LLY	1389***	155.5***	14.62***
SMC	1542***	176.3***	10.48***
VTR	1604***	185.2***	10.62***
INT	1361***	152***	8.768***
TOR	1719***	202***	12.07***
ZSC	1925***	230.6***	16.27***
NPL	2061***	249.3***	16.65***
SPV	2501***	310***	20.05***

Notes: ***is the 1% significance level.

Cross-sectional dependence implies using the second-generation panel unit root tests for more reliable results (Pesaran, 2007). This study employs CIPS and CADF panel unit root tests proposed by Pesaran (2007) to detect the integration order. The null hypothesis is the existence of a unit root in the series against the alternative hypothesis, which assumes that series are stationary. The results are illustrated in Table 4. Regarding the CIPS test, the results show that private credit, bank assets, liquid liabilities, and Gini index are non-stationary at levels, but all the other variables are stationary at levels. Nevertheless, all variables are stationary at first differences. In contrast, the results of the CADF panel unit root test show that all variables have unit root at levels but are stationary at first differences. Consequently, the variables are stationary at first difference or integrated in first order since the estimated statistic tests are below the critical values, and the null hypothesis is rejected for all the variables.

Table 4.
Second-generation panel unit root tests

	CIPS test		CADF test	
	Levels	**First-differences**	**Levels**	**First-differences**
PRV	-1.929	-4.385***	-1.938	-3.480***
BAS	-1.451	-3.896***	-1.638	-3.496***
LLY	-2.103*	-4.717***	-1.961	-4.700***
SMC	-2.424***	-4.736***	-1.822	-4.004***
VTR	-2.375***	-5.002***	-1.942	-4.357***

INT	-3.582***	-5.863***	-1.801	-4.674***
TOR	-2.726***	-5.816***	-1.884	-4.455***
ZSC	-3.053***	-6.035***	-1.528	-4.827***
NPL	-2.709***	-5.756***	-1.708	-4.595***
SPV	-2.578***	-5.552***	-1.869	-4.602***
GDP	-4.179***	-6.126***	0.535	-15.552***
GIN	-1.958	-3.595***	-1.972	-3.531***

*Notes: the critical values for CIPS test are -2.3, -2.16 and -2.08 for significance level 1%, 5% and 10% respectively. The ***, ** and * means rejection at 1%, 5% and 10% significance level, respectively.*

The next step is to determine the cointegration relationship between financial development, economic growth, and income inequality. The Westerlund (2007) cointegration test provides more reliable results since it considers the presence of cross-sectional dependence. The test proposed four error correction-based panel cointegration tests, divided into two groups. The null hypothesis presumes no existence of cointegration. The group statistics (Gτ and Gα) examine the alternative hypothesis of cointegration for the entire panel, whereas the panel statistics (Pτ and Pα) assume that at least one cross-section in the panel is cointegrated. Table 5 presents the results of Westerlund's (2007) panel cointegration test. The results establish the existence of cointegration relationships since the null hypothesis of no cointegration is rejected at a 1% or 5% significance level not only in groups but also in the whole panel in most of the estimated models.

Table 5.
Westerlund panel cointegration test

	GDP-PRV			**GDP-BAS**			**GDP-LLY**		
statistic	**value**	**z-value**	**p-value**	**value**	**z-value**	**p-value**	**value**	**z-value**	**p-value**
Gt	-3.989	-9.577	0.000	-3.490	-6.629	0.000	-3.905	-9.082	0.000
Ga	-3.217	-7.902	0.000	-17.520	-3.885	0.000	-2.366	-7.302	0.000
Pt	-0.156	-	0.000	-20.107	-11.406	0.000	-23.391	-15.162	0.000
Pa	-8.323	-15.167	0.000	-25.641	-13.069	0.000	-34.225	-19.783	0.000
	GDP-SMC			**GDP-VTR**			**GDP-INT**		
Gt	-3.616	-7.375	0.000	-3.296	-5.487	0.000	-3.506	-6.728	0.000
Ga	-17.882	-4.140	0.000	-18.119	-4.308	0.000	-19.137	-5.025	0.000
Pt	-21.179	-12.632	0.000	-21.738	-13.271	0.000	-21.413	-12.900	0.000
Pa	-26.868	-14.028	0.000	-29.912	-16.410	0.000	-27.976	-14.895	0.000
	GDP-TOR			**GDP-ZSC**			**GDP-NPL**		
Gt	-3.420	-6.216	0.000	-3.764	-8.250	0.000	-3.657	-7.616	0.000
Ga	-19.491	-5.275	0.000	-20.829	-6.219	0.000	-19.780	-5.478	0.000
Pt	-21.711	-13.240	0.000	-23.618	-15.421	0.000	-21.435	-12.925	0.000
Pa	-32.679	-18.574	0.000	-29.933	-16.426	0.000	-29.511	-16.096	0.000
	GDP-SPV			**GDP-GIN**			**GIN-PRV**		
Gt	-3.279	-5.386	0.000	-4.651	-13.483	0.000	-0.924	-7.670	0.000
Ga	-18.928	-4.878	0.000	-20.348	-5.879	0.000	-12.599	-0.414	0.384
Pt	-20.247	-11.567	0.000	-30.321	-23.086	0.000	-15.464	-6.098	0.000
Pa	-29.654	-16.208	0.000	-31.702	-17.810	0.000	-13.488	-3.563	0.088
	GIN-BAS			**GIN-LLY**			**GIN-SMC**		
Gt	-2.693	-1.930	0.027	-3.371	-5.931	0.000	-3.334	-5.708	0.000
Ga	-9.968	1.441	0.925	-11.282	0.515	0.697	-13.326	-0.927	0.177
Pt	-11.489	-1.553	0.060	-16.945	-7.792	0.000	-13.803	-4.199	0.000
Pa	-10.114	-0.924	0.178	-12.649	-2.907	0.002	-13.714	-3.740	0.000
	GIN-VTR			**GIN-INT**			**GIN-TOR**		
Gt	-3.630	-7.457	0.000	-2.815	-2.645	0.004	-2.836	-2.771	0.003

Ga	-13.802	-1.263	0.103	-10.841	0.826	0.795	-10.662	0.952	0.829
Pt	-16.183	-6.920	0.000	-14.970	-5.533	0.000	-12.859	-3.119	0.001
Pa	-15.677	-5.276	0.000	-11.740	-2.196	0.014	-11.703	-2.167	0.000
	GIN-ZSC			**GIN-NPL**			**GIN-SPV**		
Gt	-3.368	-5.911	0.000	-3.487	-6.611	0.000	-2.790	-2.501	0.006
Ga	-12.360	-0.246	0.403	-13.775	-1.244	0.107	-10.647	0.963	0.832
Pt	-16.017	-6.730	0.000	-17.172	-8.051	0.000	-13.967	-4.387	0.000
Pa	-12.725	-2.966	0.002	-15.488	-5.128	0.000	-11.752	-2.205	0.014

Notes: All models include a constant and a trend.

The panel Granger non-causality test developed by Dumitrescu and Hurlin (2012) confines the causality between financial development, economic growth, and income inequality. The null hypothesis assumes that variable X does not homogeneously cause variable Y, against the alternative hypothesis that X does Granger-cause Y for at least one panel. Table 6 presents the mixed results between financial development and economic growth. The supply-leading hypothesis is supported when private credit, stock market capitalization, net margin interest rate, and Z-score are chosen as financial development measures. On the other hand, the demand-following hypothesis is verified since the value traded and turnover ratio are financial development indicators. Moreover, the hypothesis of feedback causality is confirmed when financial development is measured by bank assets, liquid liabilities, and non-performing loans, and no causal relationship between stock price volatility and economic growth supports the hypothesis of neutrality. The results indicate a one-way causality running from inequality to economic growth and generally a one-way causality from income inequality to financial development except for the one-way causality from private credit to income inequality, two-way causality between bank assets and inequality, and no causality between income inequality and turnover ratio, Z-score and stock price volatility.

Table 6.
Dumitrescu-Hurlin panel causality test

Null hypothesis	**W bar**	**Z bar**	**p-value**	**Decision**
PRV →GDP	2.367	4.635***	0.000	Unidirectional
GDP→PRV	1.349	1.184	0.236	
BAS →GDP	4.245	11.003***	0.000	Bidirectional
GDP→BAS	1.958	3.249***	0.001	
LLY→GDP	2.765	5.984***	0.000	Bidirectional
GDP→LLY	1.584	1.980**	0.048	
SMC→GDP	2.099	3.728***	0.000	Unidirectional
GDP→SMC	1.086	0.292	0.770	
VTR→GDP	1.242	0.821	0.412	Unidirectional
GDP→VTR	1.682	2.312**	0.021	
INT→GDP	3.830	9.597***	0.000	Unidirectional
GDP→INT	1.172	0.584	0.559	
TOR→GDP	0.577	-1.433	0.152	Unidirectional
GDP→TOR	0.363	-2.159**	0.031	
ZSC→GDP	2.213	4.114***	0.000	Unidirectional
GDP→ZSC	1.548	1.860*	0.063	
NPL→GDP	2.312	4.448***	0.000	Bidirectional
GDP→NPL	2.407	4.773***	0.000	
SPV-→GDP	0.803	-0.668	0.504	No causality
GDP→SPV	1.170	0.577	0.564	
GIN→GDP	1.868	2.943***	0.003	Unidirectional

GDP→GIN	1.296	1.004	0.315	
PRV → GIN	2.024	3.473***	0.001	Unidirectional
GIN→PRV	1.017	0.057	0.955	
BAS →GIN	1.688	2.332**	0.020	Bidirectional
GIN→BAS	2.767	5.992***	0.000	
LLY→GIN	1.331	1.122	0.262	Unidirectional
GIN→LLY	2.331	4.514***	0.000	
SMC→GIN	1.023	0.080	0.937	Unidirectional
GIN→SMC	2.380	4.680***	0.000	
VTR→GIN	1.325	1.103	0.270	Unidirectional
GIN→VTR	2.317	4.467***	0.000	
INT→GIN	0.541	-1.557	0.119	Unidirectional
GIN→INT	1.865	2.935***	0.003	
TOR→GIN	1.173	0.588	0.557	No causality
GIN→TOR	0.853	-0.498	0.618	
ZSC→GIN	0.734	-0.903	0.366	No causality
GIN→ZSC	0.561	-1.488	0.137	
NPL→GIN	0.871	-0.438	0.662	Unidirectional
GIN→NPL	1.836	2.836***	0.005	
SPV-→GIN	0.755	-0.829	0.407	No causality
GIN→SPV	1.305	1.033	0.302	

*Notes: The ***, ** and * means rejection at 1%, 5% and 10% significance level, respectively.*

4. Discussion

The results of causality between financial development, economic growth, and income inequality depend on the financial development measures. The supply-leading hypothesis (Schumpeter, 1912; Christopoulos & Tsionas, 2004; Küçüksakarya, 2021) is supported, meaning that the capital allocation provided by private banks, the more liquid stock markets, the banking efficiency, and the stability of the financial system can lead to economic growth. Moreover, the two-way causality between bank assets, liquid liabilities, non-performing loans, and economic growth is consistent with the findings of Demetriades and Hussein (1996), Al-Yousif (2002), Apergis et al. (2007), Pradhan et al. (2018) and Fuinhas et al. (2020). In other words, the expansion and stability of the banking system can lead to economic growth, and the level of economic activity can lead to an increase in the size and stability of the banking sector. Furthermore, a one-way causality runs from economic growth to value traded and turnover ratio supporting the demand-following hypothesis (Robinson, 1952; Zang and Kim, 2007; Bist, 2018), meaning that economic growth leads to more active stock markets. No causal relationship is found between stock price volatility and economic growth, supporting the hypothesis of neutrality (Lucas, 1988; Shan et al., 2001; Hsueh et al., 2013). Thus, the stock market stability does not play a vital role in economic growth. Concerning the causality between economic growth and inequality, the results indicate a one-way causality from inequality to economic growth (Risso & Sanchez-Carrera, 2012; Andrade et al., 2014; Amri, 2018; Younsi & Bechtini, 2018). Finally, income inequality can lead to financial development. However, capital allocation can lead to income inequality. The results are consistent with Gimet and Lagoarde-Segot (2011), Shahbaz et al. (2015), Sehrawat and Giri (2016), and Azam and Raza (2018) that causality runs from the development of the financial sector to income inequality when private credit measures financial development and conclude that the banking expansion leads to more inequality increasing the gap between rich and poor.

5. Conclusion

The study investigates the causal relationships between financial development, economic growth, and income inequality for 23 European Union countries from 1987-2017, using ten proxies of financial development representing different dimensions of banking and stock markets development and employing the panel causality test developed by Dumitrescu-Hurlin (2012). The direction of causality between financial development, economic growth, and income inequality is sensitive to the measurement of financial development. Cross-sectional dependence implies that shocks to any country will potentially be transmitted to other countries. The results reveal a one-way causality from private credit, stock market capitalization, net margin interest rate, and Z-score to economic growth, a two-way causality between bank assets, liquid liabilities, non-performing loans, and economic growth, a one-way causality running from economic growth to value traded and turnover ratio and no causality between stock price volatility and economic growth. In addition, the results indicate a one-way causality from inequality to economic growth. Finally, a one-way causality exists from income inequality to financial development, one-way causality from private credit to income inequality, a two-way causality between bank assets and inequality, and an absence of causality between income inequality and turnover ratio, Z-score, and stock price volatility. The European Union countries need to adopt policies promoting the expansion of the financial system through allocating credit to the private sector and easing access to financial services. Also, significant decisions related to the stability of the banking system are needed to support economic growth. However, policies that can boost economic activity will encourage stock market development, and better income distribution could lead to more financial development, stability, and efficiency and foster economic growth.

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