Impact of financial liberalization on income inequality: a PVAR approach

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Abstract

I estimate a panel vector autoregressive model (PVAR) to study the impact of financial liberalization on income inequality. The analysis is carried out for 162 countries over the period 1980-2015.

The results show that capital account liberalization and financial development increase inequality. However, it change according to the category of income countries (low, middle and high-income) and according to the period of study used (before and after 1990).

The shocks caused by the indicators of financial liberalization on income inequality are very low but persistent in time.

Keywords: financial liberalization, income, inequality, PVAR.
JEL classification : F38; F41; F02

1. Introduction

Criticism has been leveled at financial liberalization since 1990 (e.g., financial instability, financial crises, banking crises, increased inequalities, etc.) (Rodrik, D. (1997), and Broner and Ventura (2010)). More recent criticism has mentioned the increase in the income inequality for developing countries as well as for developed countries. The rise in income inequality is due to the decline in the quality of institutions and the weakness of pro-worker economic policies, replaced by a neo-liberal model. Other recent issues also weaken workers' rights, which include social protection, the privatization of public services and the deregulation of financial markets. The process of financial liberalization seems to favor these inequalities.

Theoretically, impact of financial liberalization on inequality is ambiguous. Empirically, the relationship is also very mixed. It would be interesting to contribute to this field of research by providing a few novelties. I propose the decomposition of this relationship according to the incomes countries categories and according to the period of study regarded (before and after 1990). I use the method of panel vector autoregression (PVAR) developed by Love and Zicchino (2006). PVARs combine the advantages of the traditional Vector Autoregression (VAR) with the advantages of panel-data models.

Our indicators grouping the main components of the process of financial liberalization (capital account liberalization, financial development, and financial globalization). With a panel composed of 162 countries for the period from 1980 to 2015 (table 1).

The analysis is distributed among countries with low, middle, and high incomes. This distinction may help to validate our results. Intercountry inequality is examined by Summers, Kravis, and Heston (1984). They discover that income inequality fell sharply across industrialized countries from 1950 to 1980, declined somewhat for middle-income ones, and rose slightly for low-income nations. Our analysis start with the end of their analysis (1980), the impact sought may differ according to the temporal

scale. I divided the analysis into two sub-periods, from 1980 to 1990 and from 1991 to 2015.

The results found in this study are the following:

First, the baseline model, using all panel countries, shows a positive contribution of capital account liberalization and financial development on the rise of inequality. Oppositely, the financial globalization reduces it.

Second, when I do the difference of panels according to the category of income, results are different. The capital account liberalization reduces the income inequality except for the high-income economies. The financial development reduces the income inequality except for the low-income economies. We show an opposite effect is also detected between capital account liberalization and financial development for low and high-income countries.

Third, the first period (from 1980 to 1990) presents more significant results than the second period. Negative impact of capital account liberalization and financial globalization on the rise of inequality is detected.

The paper is organized as follows: The following section presents a literature review on the related financial liberalization and inequality. Third section presents the variables determinants for this relationship. I present after my empirical models, the statistical tests of specifications and the results found. The two last sections interprets these results and gives the necessary conclusions.

2. Literature review

The analysis of the impact of finance on the inequality has essentially scope on three components: financial liberalization, financial development and globalization. The results of this impact were multiple as well theoretically and empirically (J-E. Sturm and J. de Haan, 2017).

Theoretically, financial liberalization may affect income distribution, first, when it acts against the imperfections of the credit markets for the benefit of poor agents and thus reduces inequalities (Banerjee and Newman, (1993)). Second, financial liberalization leads to greater equity in the access to credit that makes the domestic financial market more efficient (Abiad and al. 2008). All these effects however are hardly to be seen in practice. In most cases, financial liberalizations have not been successful. Even if growth may have accelerated, though not in all cases, efficiency has decreased and income distribution has worsened, leading to an increase in inequality.

Empirically results are also diverse; some recent studies (based on cross-country data) report financial liberalization reduces income inequality (Delis and al. (2014), and Li and Yu (2014)). Some others conclude that financial liberalization increases inequality (Jaumotte and Buitron O. (2015); Furceri and Lungani (2015), and LaGarda and al. (2016)).

I present in the following some works on this relation with different impacts.

Among the recent studies, Furceri and Loungani (2015) have used a panel of 150 countries over the period 1970 to 2010. They estimate an equation of inequality univariate autoregressive, with dependent variable the logarithm of the annual variation of Gini coefficient which is explained by a dummy variable which takes 1 in a period of liberalization of the capital account and 0 for other periods and explained by a vector X of control variables. They show that the increase of the liberalization of the capital account has been followed by an increase in the inequalities. However, they found two channels to which this association is limited: the first, the impact of liberalization on inequality is low for the countries with high levels of financial development. The second, this impact is also low in cases where liberalization is not followed by a crisis.

For their recent analysis in 2017, with 224 episodes of liberalization of the capital account, most during the past two decades, the same authors use a regression "kitchen-sink" involving many potential determinants of this relationship. Using an autoregressive equation which the dependent variable is the growth rate of the inequality measured by the logarithm of the annual variation of Gini coefficient. They

find that the capital account liberalization (Chinn-Ito index) leads to a decline in the fair sharing of labor income and which corresponds to an increase of the coefficient of the Gini indicator. Similarly, these adverse effects on the inequality are most apparent when the liberalization is accompanied by a large increase in capital flows, an increase of commercial opening and more extensive technological exchange.

A similar study of LaGarda and al. (2016) examine the idea according to which the liberalization of the capital account is associated with inequality of income among the emerging economies and developing countries. The authors show several different impacts of capital account liberalization during the movements of "comes and goes" of capital flows. During normal periods (moderate liberalization), they found a positive impact on inequality, then that in a period of increased liberalization of the capital account the inequality deteriorates and called to more active policies.

J. De Haan, R. Pleninger and J.E. Sturm (2017) re-examines the impact of the financial liberalization on income inequality using a panel model with fixed effects for a wide sample of countries covering the period 1975-2005, while laying down the analysis on the countries with more of income inequality. The dependent variable is the average over 5 years of Gini coefficents. They also use two indicators of financial liberalization: indicator of Abiad, Detragiache, and Tressel (2010) and Chinn-Ito indicator of liberalization of the capital account (Chinn and Ito 2006; 2008). The authors find that the financial liberalization is associated with an increase in the inequality of income. This increase is mainly the more remarkable among countries with financial systems more developed.

Theoretically, the relationship between liberalization and inequality of income is ambiguous, as suggested Bumann and Lensink (2016). These authors have developed a theoritical model comprising several agents investors in relationship with the banking system. Their model suggests that financial liberalization allow an equitable distribution of income for the countries with more depth of the financial systems. Their empirical estimates confirm this hypothesis. More specifically, their estimations suggest that the liberalization of the capital account led to a decline of the inequality of income if the level of financial deepening, measure by private appropriations as a percentage of GDP, exceed 25%.

Other authors are looked on globalization. Jaumotte, and al. (2013) use a panel of 51 countries for 23 years from 1981 to 2003. The equation used explains the logarithm of the Gini coefficient by variables of commercial globalization, variables of financial globalization, variables reflecting the technological progress and other variables of controls. The paper presents estimates confirming the higher impact of technological progress on the inequality than that of globalization.

Dabla-Norris and al. (2015) found that financial globalization can facilitate an international allocation efficient capital and promotes a better sharing of the risk. At the same time, the increase of capital flows, particularly foreign direct investment and portfolio investment seem to increase the income inequality as well for the developed countries and emerging economies.

3. Liberalization and the determinants of income inequality

The Gini coefficient is often used to measure the inequality; it gives a value of 0 if the total income is also shared in a country, and 100 if a single individual account for the totality of the income. If the Gini coefficient increases inequality is increasing.

As dependent variable, I use the first difference of the logarithm of Gini coefficients (noted *DLGINI*). These coefficients are obtained based on households' gross income from Solt's (2009) Standardized World Income Inequality Database (SWIID, 2016)[1].

In conjunction with the papers previously presented, I use the *KAOPEN* index to reflect the capital account liberalization. It is a measure of the degree of opening of the capital account of a country. Chinn and Ito initially used this indicator in 2006. KAOPEN is based on information regarding restrictions in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). This indicator varies between -1.856 (more controlled capital account) to 2.456 (less controlled).

[1] This database presents several types of inequality; we have taken statistics on income inequality. It also shows the GINI indicator for 1 percentile of the total population for each country and ranges from 1 to 100 percentiles. We calculated the average of these 100 percentiles to have a single GINI indicator of the entire population.

The financial liberalization process has often been correlated with the financial development (McKinnon, 1973; Shaw 1973; Demirgüç-Kunt and Detragiache, 1998). The variable *LF_Dev* will represent the financial development. The data of this index is collect from K. Svirydzenka, (2016), the author use a broad multi-dimensional approach to defining financial development follows the matrix of financial system characteristics developed by Čihák and al. (2012).

The sharp deepening in financial liberalization represents one of the key implications of globalization. The close relationship between financial liberalization and globalization is not in doubt[2] (Prasad, Kose, Rogoff, and Wei (2009).; Broner and Ventura, (2008)). I use the KOF Index of Globalization (noted *GLOBAL)* to reflect globalization. This Index measures the economic, social and political dimensions of globalisation.

The three previous variables, *KAOPEN*, *LF_Dev*, and *GLOBAL* will be the main variables of explanatory income inequality in the following empirical models.

The liberalization of capital movements can be a source of volatility - abundant capital inflows, followed by outputs, and vice versa. The criticism of the liberalization are convinced that this volatility is a source of Crisis (Stiglitz, J. 2000). At the same time, liberalization should, in theory, increase the sources of capital available to borrowers of the country. In practice, the strength of domestic financial institutions may be a crucial factor that determines if this occurs or not.

The impact of the liberalization is more marked when it is followed by a crisis and when the level of development and inclusion of the financial sector is low (De Haana, Pleningera and Sturm. (2018)). To consider these two elements, I followed the procedure of Furceri and Loungani (2015) by constructing two composite indexes: the first noted *KAOPENXCRISIS*[3] and the second *KAOPENXDEV*. These two-composite

[2] Although that empirical verification of this relationship financial liberalization/globalization is not certain due to the diversity of indicators used for the two process.
[3] *CRISIS* range from 0 to 7. Used by Reinhart, Camen M. and Kenneth S. Rogoff (2010) and based on 7 types of crises: currency crisis; Inflation Crisis; Stock market crash; Sovereign debt crises"domestic"; Sovereign debt crises "external"; Banking Crises. "1" is given for each type of these crises.

indexes are added to the three previous variables to form an explanatory model of *DLGINI*.

Income inequalities are also created or exacerbated by the mechanisms of the market. The inequalities of income would be greatly due to the offer and the demand in the employment market. The individual talent and the demand for such capabilities are the main criteria for fixing wages and primary determinants of income levels. The level of education of workers may reflect this aspect. I thus use a variable "*School*" measuring the School enrollment, primary and secondary (gross).

The technological changes of recent decades have polarized the labor market by promoting the highly skilled workers, to the detriment of those who are very little. The expenditure on research and development go hand in hand with technological progress. This variable (noted *RD*) will be included in our models. However, its data start only from the year 1996.

The globalization of trade has the effect to polarize incomes: it exerts a growing pressure on low-skilled workers in developed countries to accept a lower compensation, and it encourages to remunerate much better workers who are more qualified. The competition between workers and between nations would have greatly contributed to the increase in inequalities between nations and between individuals. The ratio of open trade will be representative of this aspect, it will be noted *TRADE*.

The variables *CRISIS*, *School*, *RD* and *TRADE*[4] will be added one by one to our three basic variables *KAOPEN*, *LF_Dev* and *GLOBAL* to form models to explain *DLGINI*. The description of all these variables are grouped in the table 2 of appendices[5]. (See also table 3 for the descriptive statistics and correlation of these variables).

4. Evolution Financial liberalization/income inequality

[4] I have applied the logarithm to these variables.

[5] Many others variables can be included in this analysis and have a clear impact on inequality. Among these variables, I note GDP, inflation, population, the economic and political institutional quality…Unfortunately; we cannot use all this number of variables in a pvar.

It is not obvious to draw the graphs of 162 countries. A graph grouping all the countries can provide information on the overall evolution of these variables but will not be very significant in taking the average of these variables. To do so, I have calculated the average of each indicator for all countries for each year. This has enabled us to obtain a general pace of the average of all countries between 1980 and 2015.

The Graph 1 represents the evolution of the index Gini and of our three indicators of liberalization for the whole panel. It shows an increase in the average of the *GINI* index up until 2005 and then a gradual decline until 2015. Despite the decline, this index remains high and has never fallen below 0.36 for the entire period.

For our indicators of financial liberalization, we note a generally bottom-up pace of three indicators. This may reflect the continuity of this process of liberalization throughout the period of analysis. It also shows a similarity of the financial information made by these variables.

The Graph 2 represents the evolution of the *GINI* coefficient for each category of income of countries (low, middle and high income). The pace is very similar between the low-income and middle-income economies, it is a little fluctuating up to 1990, and then up-scaling up to 2005 and then it gradually drops. For the high-income economies, it differs a little. The *GINI* indicator increases up to 2009, and then declines up to 2015.

In summary, two stylized facts emerge from these graphs. First, an evolution almost similar between the Gini index and financial indicators for a large part of the period of analysis. This similarity is supported also by a great similarity between the evolution of our indicators of financial liberalization. Second, a similar evolution of the Gini index for the low-income and middle-income groups, but a little less for the high-income. The three categories of income present a bottom-up pace just before 1990.

5. Specification of the models

I use a panel-data vector autoregression methodology. This technique uses the traditional VAR approach, which treats all the variables in the system as endogenous, with the panel-data approach, which allows for unobserved individual heterogeneity.

The PVAR technique is particularly suitable for our purposes because we seek to model the evolution of a system of our variables of interest— inequality index, financial development, capital account liberalization, and financial globalization (*DLGINI*, *LF_Dev*, *KAOPEN*, and *GLOBAL*)—in a set of countries which significantly differ along various dimensions such as the development of their financial and economic systems and the level of financial openness. These unobservable country-specific differences are captured with country fixed effects in our model.

The structure of our baseline PVAR model can be written in reduced form as follows:

$$Y_{it} = \Gamma 0 + \Gamma 1\ Y_{i,t-1} + f_i + dt + £_{it}$$

where Y_{it} is a vector of our variables (*DLGINI*, *LF_Dev*, *KAOPEN*, and *GLOBAL*) for year "t" and country "i" and modeled as a function of the first-order lags of all variables in the system. The f_i and d_t terms are country fixed effects and time fixed effects respectively.

The baseline model to estimate brings together all the countries (162 countries) for the period from 1980 to 2015. The second step is to estimate this model according to the three income classes, low-income countries (29), medium income (87), and high income (46). In a third step, we take the change in opinion on the effects of the financial liberalization by splitting the period of analysis into two sub-periods, from 1980 to 1990 and from 1991 to 2015.

I follow the steps of Abrigo and Love (2015), who presented a package of controls on STATA for analysis of the Panel VAR models. Based on the two models of criteria for the selection of Andrews and Lu (2001) (MBIC,and MQIC) and the coefficient of determination overall, the model with a single delay is preferred, since it presents the lowest values of MBIC and MQIC (Table 5)[6].

[6] To lighten the appendices we did not include the stability tests of our models, which confirm that these estimates are stable for all models, tested (Eigenvalue stability condition).

The augmented Dickey-Fuller and Phillips-Perron tests shows the absence of unit root for our four variables (Table 4). We reject the null hypothesis of the presence of unit root. This observation is also valid for the indicator *LF_Dev*, at the 5% significance level (the others are valid for 1% significance level).

The non-presence of the unit root has enabled us to move to the study of the causality between our variables. The results of the estimation of the baseline model are presented in Table 6. The models 1 to 6 are composed by our basic variables: *DLGINI*, *KAOPEN*, *LF_Dev*, *LGLOBAL* and for each model, I add a new explanatory variable of the inequality among the following variables: *CRISIS*, *KAOPENXCRISIS*, *KAOPENXDEV*, *LTrade*, *LSchool* and *LRD*. The Model 6 is a complete baseline model using all the variables cited[7].

6. Results interpretations

These models show that capital account liberalization (*KAOPEN*) has a significant and positive relationship with the variation in income inequality. For all six models capital account liberalization increase income inequality ((Furceri and Loungani (2015); Jaumotte and Buitron (2015)). We can explain this result by the fact that financial liberalization can skew the allocation of credit to those who do not need it and ignore those who need it and thus increase inequalities when financial institutions are of low quality and credit provision is misguided. Also, thanks to the increase in foreign direct investment (FDI) in the host economy. Since capital and skilled labor tend to be complements, opening the capital account can increase the demand for skilled labor compared to unskilled labor, leading to higher wage inequality.

Financial development participate also to the increase of income inequality. Our result join some previous studies, for example, Dollar and Kraay (2002), Beck and al. (2003) show that in the early stage of financial development, financial sector may charge high set up cost against financial services during to gain advantages from the screening and risk pooling which is beyond the affordability of poor individuals. Hence, poor individuals are unable to come out from the circle of income inequality. Claessens

[7] Except LSchool variable, for need of the progress of the estimate.

and Perotti (2007) provided another reason due to which poor people are unable to access the benefit of financial development. They argued that since poor individuals are not much educated, formal financial sector does not seem to prefer such un-educated or less-educated persons to offer loans, and hence in many high-income countries, financial sector has dualism in financial services. Greenwood and Jovanovich (1990) proposed a non-linear relationship between financial development and income inequality or what we may call as ‘‘inverted-U’’ hypothesis. They argued that initially financial development increases income inequality and improves income distribution once financial sector matures.

Financial development combined with a periods of liberalization (*KAOPENXDEV* indicator) also participate to the rise of income inequality, but the impact became more much low (De Haana, Pleningera and Sturm, 2018). The impact of financial liberalization on inequality seems to be conditioned by the level of financial development. This later strengthens the inequality-raising impact of financial liberalization, i.e. financial liberalization increases inequality in particular in those countries in which the level of financial development is already high.

For the other composite index (*KAOPENXCRISIS*), and oppositely to the finding of Furceri and Loungani (2015), the impact on income inequality is negative. It should be noted that not all the financial crises exacerbate inequalities due to compensating effects (Otker-Robe and Podpiera, 2013). On the one hand, they can reduce the inequalities, because bankruptcies and the fall in the prices of assets usually affect more the more affluent. On the other, the financial crises related to sustainable recessions can hit disproportionately the poorest - and dig the inequalities.

The financial globalization index and the trade variable reduces income inequality (Shang-Jin Wei and Yi Wu 2018). In countries with strong financial institutions, financial globalization may reduce inequality by allowing better consumption smoothing and lower volatility and trade openness exerts an equalizing effect.

The successive addition of other explanatory variables of inequalities show that the indicator of crisis, the trade openness and the research & development tend to reduce inequality. Whereas, the school enrollment favors them.

The impacts of financial liberalization and financial development on income inequalities are source of ambiguities (De Haana, Pleningera and Sturm (2018), Furceri and Loungani (2015, 2017), Bumann and Lensink (2016)). The repartition on countries regarding their income categories help us to response to these conflicts.

Based on the results of table 7, we can conclude that financial development for low-income countries (which is weak comparing to others categories of income countries)[8] participate to the increase of inequalities and act in opposite direction to the capital account liberalization (The Wald test of causation in Table 8 confirms the results of table 7) . For the high-income countries (which have advanced stages on capital account liberalization), financial development act also in opposite direction by increasing the inequalities (reduced by capital account liberalization). For the middle-income countries (by hypothesis have a moderate financial development and account capital liberalization), both variables acts to reduce income inequalities. The opposite signs of the coefficients of KAOPEN and LF_Dev show clearly that capital account liberalization and financial development levels (between low and high-income countries) act in opposite directions in terms of rising of income inequality. For the globalization index same results are found with the baseline models, it tends to reduce income inequalities for all income categories of countries[9].

The subdivision of the analysis period shows that the results of the first period are similar to the previous results (a negative impact of *KAOPEN* and *LGLOBAL* indexes and a positive impact of *LF_Dev*). The second period does not present significant coefficients and shows that the majority of the impact on income inequality

[8] Based on previous works on financial liberalization and financial development, I suppose that low-income countries have low level of capital account liberalization and financial development, middle-income countries have average level and high-income countries are advanced.

[9] I removed all the indicators in relationship with the crises (Crisis, KAOPENXCRISIS and KAOPENXDEV). Similarly, I don't use the variable research & development whose data exists only from 1996 and who risk to strongly reduce our statistical data.

is captured by the variation of the *GINI* index of the previous year (t-1) (value of 0.72 for the coefficient with a "t-student" very significant 15.28).

Variance decompositions show the percent of the total variation in one variable that is explained by the shock of another variable after a certain amount of time. They therefore provide an indication of the magnitude of the total effect one variable exerts on another. We report the total effect accumulated over 10 years. The variance decompositions for the different models are presented in Table 9. The results, for the baseline model, shows a low impact of *KAOPEN*, *LF_Dev* and *LGLOBAL* on the *DLGINI* index. These indexes affect the variation of inequality index with the respective variation of 4.7%; and 8.6% and 8.2%. This impact is particularly very low for two models: the high-income model and the second period model (has never exceed 5.8%).

The Impulse response function (graph 3) describe the reaction of one variable to the innovations in another variable in the system, while holding all other shocks equal to zero. The first result of the IRF graph (*the last right column of the graph*)[10] shows that the impact of financial liberalization on income inequality is not immediately. The shocks of the financial liberalization index (capital account, financial development and globalization) take on average 5 to 10 years. The second outcome is that the shocks[11] caused by our different indicators are very low and presents slight shocks. We can conclude that the indicators of financial liberalization cause small but persistent shocks on the variation of income inequality.

7. Conclusion

Taken in the entirety of the sample of 162 countries, the liberalization of the capital account as well as the financial development have a positive impact on income inequalities. In contrast, globalization tends to reduce these inequalities.

[10] I decline the interpretation of other graphics that can inform us on the causality in the opposite direction, DLGINI toward financial liberalization indexes, or, which also reflect the multiple shocks between the various indicators of financial liberalization.

[11] The magnitude of the shock corresponds to one-unit standard deviation of the indicator used.

The interest of this study is much more apparent with the subdivision of the global sample according to the income categories of the countries. It seems that the degrees of liberalization of capital account and financial development play a key role in determining this impact. Great part of the various results of previous works may be due to this ignorance of this subdivision of income categories.

The countries, which are the reduction of inequalities, one of their major objectives will no doubt have to structure the liberalization in reconciling this priority and the benefits of an increase of productivity and growth. We also find that the impact of liberalization on the inequalities is mitigated when the country has a high level of financial development. This reinforces the idea that the benefits of liberalization outweigh its costs in the countries having exceeded a certain level of financial development.

The 1980-1990 decade seems to bring more information about this relationship, while the results from recent years are more ambiguous (non-significant results between 1991 and 2015).

Finally, the Gini coefficient change slowly in the Duration: The variations have a standard deviation of 2%. The variance decomposition and the impulse response functions analysis shows that impact of shocks of financial liberalization on income inequality are very small but persistent (it stays from 5 to 10 years). This impact are even confirms after the considering of several other factors of inequality, such as the opening of trade, the evolution of the school enrollment, and the technological progress.

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Appendices

Table 1- Panel countries (Income groups)

Low-income economies ($1,005 or less) - 29 countries

Afghanistan	Guinea	Rwanda	Congo, Dem. Rep	Mali	Central African Republic
Benin	Guinea-Bissau	Senegal	Eritrea	Mozambique	Chad
Burkina Faso	Haiti	Sierra Leone	Ethiopia	Nepal	Comoros
Burundi	Korea, Dem. People's Rep.	Tanzania	Gambia, The	Niger	Liberia
Madagascar	Uganda	Togo	Malawi	Zimbabwe	

Lower middle-income economies ($1,006 to $3,955) and upper-middle-income economies ($3,956 to $12,235) – 87 countries

Angola	Indonesia	Philippines	Sudan	Lesotho	Tunisia
Armenia	Jordan	Kyrgyz Republic	Swaziland	Mauritania	Ukraine
Bangladesh	Kiribati	Sri Lanka	Syrian Arab Republic	Moldova	Uzbekistan
Bhutan	Côte d'Ivoire	Vietnam	Tajikistan	Nicaragua	Ghana
Bolivia	Djibouti	Yemen, Rep.	Morocco	Nigeria	Guatemala
Cabo Verde	Egypt, Arab Rep.	Zambia	Myanmar	Pakistan	Honduras
Cambodia	El Salvador	Papua New Guinea	India	Cameroon	
Albania	Ecuador	Algeria	Fiji	Panama	South Africa
Argentina	Grenada	Peru	Samoa	Jamaica	St. Lucia
Azerbaijan	Guyana	Romania	Bosnia and Herzegovina	Kazakhstan	St. Vincent and the Grenadines
Belarus	Iran, Islamic Rep.	Russian Federation	Botswana	Lebanon	Suriname
Belize	Gabon	Paraguay	Brazil	Libya	Thailand
Colombia	Turkmenistan	Malaysia	China	Macedonia, FYR	Tonga
Costa Rica	Venezuela, RB	Maldives	Equatorial Guinea	Dominican Republic	Turkey
Croatia	Mauritius	Namibia	Mexico		

High-income economies ($12,236 or more) - 46 countries

Antigua and Barbuda	Greece	Poland	Portugal	Qatar	Singapore
Australia	Iceland	Saudi Arabia	Bermuda	Italy	Slovak Republic
Austria	Ireland	Seychelles	Spain	United Arab Emirates	Kuwait
Japan	Slovenia	Cyprus	St. Kitts and Nevis	United Kingdom	Latvia
Bahrain	Canada	Czech Republic	Netherlands	United States	France
Barbados	Chile	Denmark	Sweden	Uruguay	Lithuania
	Malta	Estonia	Switzerland	Germany	Oman
Finland	New Zealand	Norway	Trinidad and Tobago		

Note: Countries are classified according to World Bank's income group classification for the year 2018

Table 2- Variables Description and Sources

Variables	Notation	Sources
GINI index First difference of the logarithm of GINI	DLGINI	Standardized World Income Inequality Database (SWIID, 2016)

Index of capital account controls	KAOPEN	Chinn and Ito (2015) " A de jure measure of financial openness " http://web.pdx.edu/~ito/Chinn-Ito_website.htm The Chinn-Ito index (KAOPEN) is an index measuring a country's degree of capital account openness.
Financial Development Index	F_Dev	Katsiaryna Svirydzenka, 2016, Introducing a New Broad-based Index of Financial Development; A broad multi-dimensional approach to defining financial development follows the matrix of financial system characteristics developed by Čihák et al. (2012).
Globalization index	GLOBAL	KOF Index of Globalization (2016) Dreher, Axel; Noel Gaston and Pim Martens, 2008, Measuring Globalization. The KOF globalization Index measures the economic, social and political dimensions of globalization. globalization in the economic, social, and political fields.
CRISIS index	CRISIS	Reinhart, Camen M. and Kenneth S. Rogoff, "From Financial Crash to Debt Crisis," NBER Working Paper 15795, March 2010. Reinhart, Carmen M. ,"This Time is Different Chartbook: Country Histories on Debt, Default, and Financial Crises," NBER Working Paper 15815, March 2010. Crisis tally range from 0 to 7. Types of crises: currency crisis; Inflation Crisis; Stock market crash; Sovereign debt crises"domestic"; Sovereign debt crises"external"; Banking Crises. "1" is given for each type of these crises.
KAOPENXCRISIS index	KAOPENXCRISIS	Multiplying KAOPEN and CRISIS indexes
KAOPENXDEV index	KAOPENXDEV	Multiplying KAOPEN and F_Dev indexes
Open Trade ratio (% GDP)	Trade	WDI, 2016
Research and development expenditure (% of GDP)	RD	WDI, 2016
School enrollment, primary and secondary (gross), gender parity index (GPI)	School	WDI, 2016

Table 3 –Summary Statistics

1/ Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
GINI	3921	0.38	0.87	0.18	0.06
KAOPEN	5271	0.07	1.56	-1.9	2.37
GLOBAL	5586	49.17	18.19	10.55	92.62
F_Dev	5704	0.25	0.21	0	1
Trade	5202	81.15	49.43	0.16	531.73
RD	1441	0.95	0.89	0.005	4.27
School	3558	0.94	0.14	0	1.43

All variables are included in levels except for the dependent variable GINI that is included in differences.

2/ Correlation

	DLGINI	KAOPEN	LGLOBAL	LF_Dev	LTrade	LRD	LSchool
DLGINI	1.000						
KAOPEN	0.137	1.0000					
LGLOBAL	0.151	0.626	1.0000				
LF_Dev	0.117	0.437	0.753	1.0000			
LTrade	0.037	0.0983	0.295	-0.019	1.0000		
LRD	0.232	0.348	0.657	0.740	0.015	1.0000	
LSchool	0.059	0.258	0.371	0.292	0.180	0.193	1.0000

Table 4. Fisher Panel Unit Root Tests

Variable		Augmented Duckey-Fuller		Phillips-Perron	
LGINI	Level	458.95	*	394.73	*
KAOPEN	Level	582.32	*	804.82	*
LF_Dev	Level lag (3)	376.818	**	374.86	**
GLOBAL	Level	403.91	*	561.46	*
LTrade	Level	461.75	*	448.73	*
LSchool	Level	*636.6*	*	819.95	*
LRD	Level	228.2	*	244.5	*

* and ** denote significance at 1 percent and 5 percent respectively.

Table 5 - Selection order criteria

Sample: 1984 - 2013 No. of obs = 1022
No. of panels = 45
Ave. no. of T = 22.711

lag	CD	J	J p_value	MBIC	MQIC
1	**0.999925**	**77.27**	**0.40**	**-442.44**	**-213.09**
2	0.999987	36.96	0.91	-309.50	-156.61
3	0.9997803	17.57	0.85	-155.65	-79.21

Table 6. One-step Generalized Method of Moments Dynamic Estimation Results – Sample all panel - Basic model.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
DLIGINI	0.19	0.25	0.23	0.048	0.087	0.11
	(4.6)	(5.93)	(5.43)	(8.55)	(5.22)	(3.96)
KAOPEN	0.07	0.003	0.007	0.002	0.005	0.024
	(4.63)	(2.65)	(4.51)	(3.46)	(4.67)	(6.38)
LF_Dev	0.03	0.007	0.032	0.019	0.026	0.1
	(4.5)	(1.39)	(4.89)	(3.5)	(4.17)	(5.95)
LGLOBAL	-0.1	-0.4	-0.1	-0.031	-0.09	-0.18
	(-5.76)	(-3.06)	(-5.87)	(-4.88)	(-5.87)	(-4.33)
CRISIS	-0.015					0.002
	(-2.79)					(2.77)
KAOPENXCRISIS		-0.0005				-0.001
		(-2.45)				(-3.17)
KAOPENXDEV			0.0008			0.023
			(2.3)			(1.72)
LTrade				-0.02		-0.044
				(-5.34)		(-3.66)
LSchool					0.06	
					(5.34)	
LRD						-0.06
(from 1996 to 2015)						(-9.92)

Table 7 – Panel vector autoregression – GMM estimation

	Low-income	Middle-income	High-income	1980-1990	1991-2015
DLIGINI	0.04	-0.02	0.05	0.02	0.72
	(3.04)	(-0.95)	(5.81)	(3.89)	(15.28)
KAOPEN	-0.22	-0.003	0.002	-0.03	-0.0004
	(-9.28)	(-3.33)	(2.26)	(-5.64)	(-0.5)
LF_Dev	0.08	-0.1	-0.02	0.17	-0.016
	(7.76)	(-3.51)	(-2.31)	(5.41)	(-1.27)
LGLOBAL	-0.0005	0.0003	-0.0003	-0.002	0.0001
	(-4.75)	(1.53)	(-1.89)	(-3.71)	(1.22)
LTrade	0.02	0.008	0.003	0.01	0.001
	(4.33)	(0.95)	(0.53)	(1.12)	(0.29)
LSchool	-0.02	0.04	-0.19	0.12	-0.02
	(-5.50)	(0.45)	(-3.66)	(6.63)	(-2.38)

Table 8– panel VAR-Granger causality Wald test

Ho: Excluded variable does not Granger-cause Equation variable

Ha: Excluded variable Granger-causes Equation variable

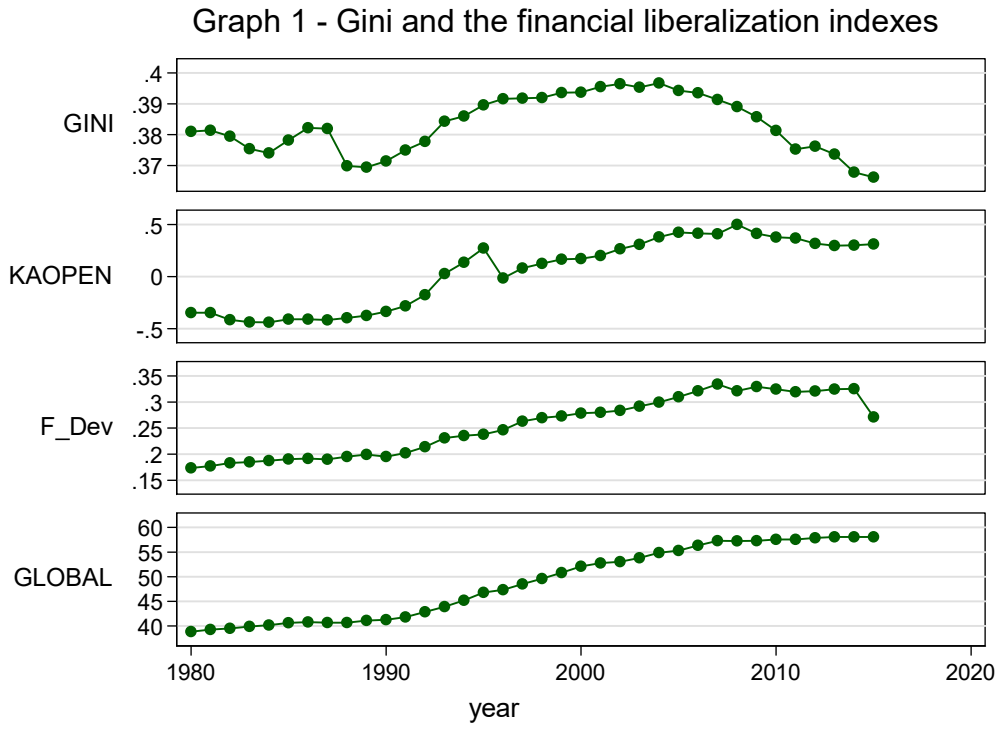
Equation Variable	Excluded Variable					
DLIGINI	KAOPEN		LF_Dev		LGLOBAL	
	Chi2	prob>chi2	Chi2	prob>chi2	Chi2	prob>chi2
Baseline model	21.397	0.000	20.228	0.000	33.146	0.000
Low-income model	86.035	0.000	60.188	0.000	22.528	0.000
Middle- income model	11.094	0.001	12.354	0.000	2.330	0.127
High-income model	5.087	0.024	5.349	0.021	3.572	0.059
"1980-1990" model	31.801	0.000	29.283	0.000	13.761	0.000
"1991-2015" model	0.255	0.614	1.617	0.203	1.479	0.224

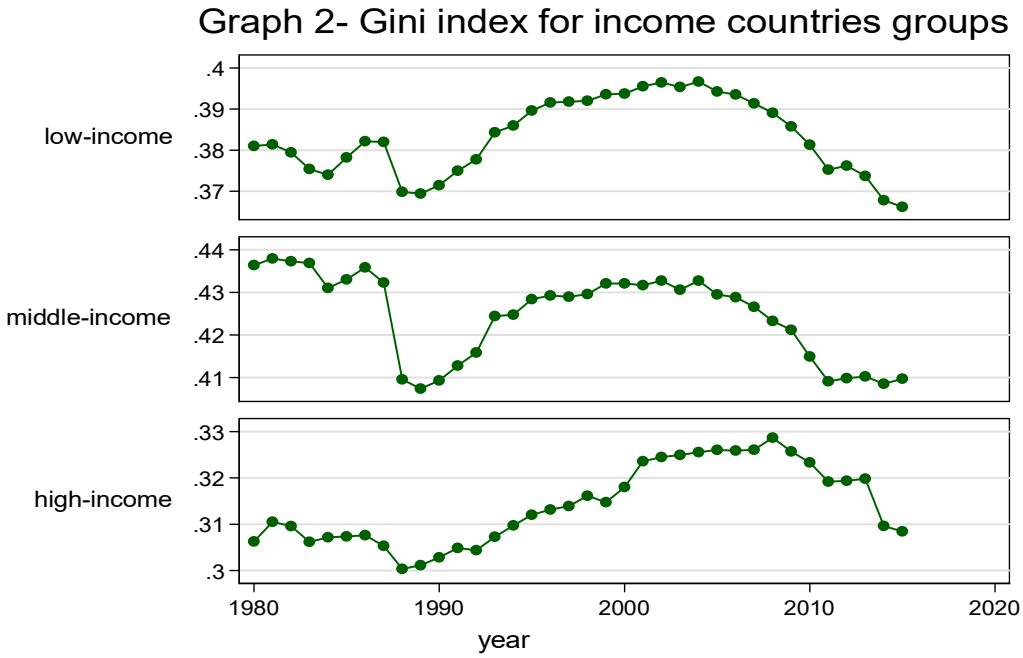
Table 9 - Forecast-error variance decomposition

Model	Response variable and Forecast horizon (from 0 to 10 years)	Impulse variables			
		DLGINI	KAOPEN	LF_Dev	LGLOBAL
All panel	DLGINI				
	0	0	0	0	0
	10	0.7740082	0.0471314	0.0869715	0.0828256
Low-income panel	DLGINI				
	0	0	0	0	0
	10	0.571426	0.2933404	0.0042563	0.0219178
Middle-income panel	DLGINI				
	0	0	0	0	0
	10	0.4605168	0.0169273	0.3265682	0.0679646
High-income panel	DLGINI				
	0	0	0	0	0
	10	0.8597383	0.0152856	0.0031238	0.0207408
"1980-1990" panel	DLGINI				
	0	0	0	0	0
	10	0.6110408	0.267246	0.0772872	0.0204598
"1991-2015" panel	DLGINI				
	0	0	0	0	0

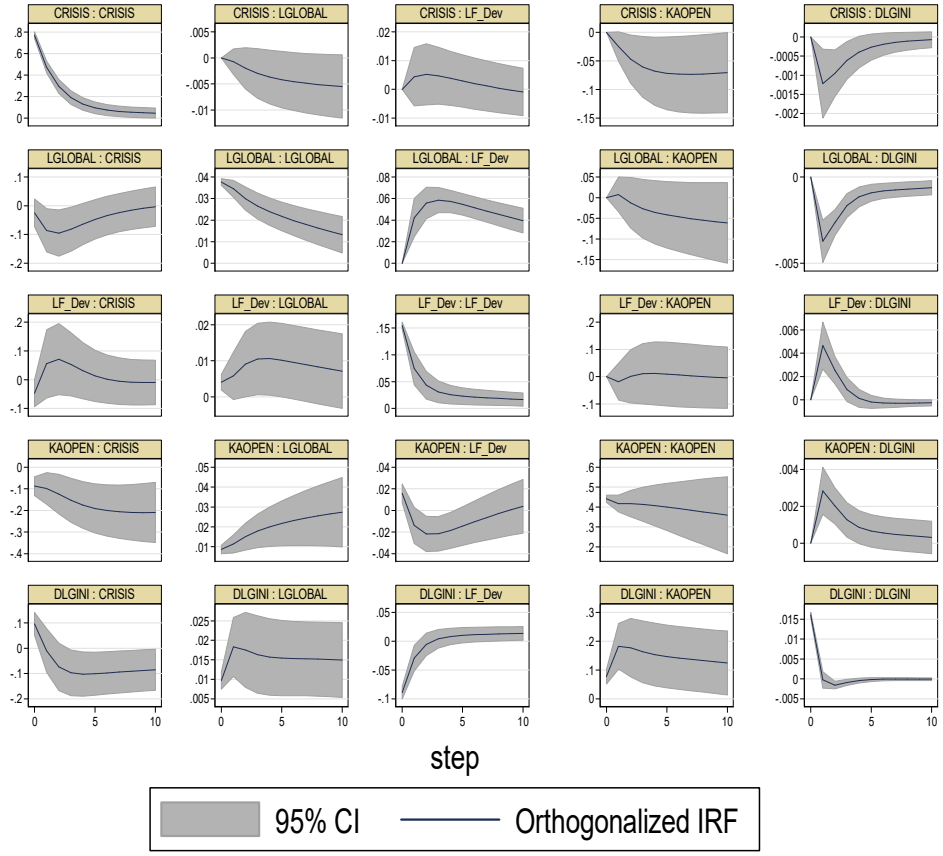
	10	0.9057425	0.0183616	0.0327509	0.058663

Percent of variation in the DLGINI variable (10 periods ahead) explained by Impulse variables (DLGINI, KAOPEN, LF_Dev, and LGOLBAL).





Graph 3- IRF baseline model



impulse : response