



# Exchange rate pressure, fiscal redistribution and poverty in developing countries

Sèna Kimm Gnanon<sup>1</sup>

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## Abstract

This article investigates the interplay between the exchange rate pressure (ERP), which is a proxy for export demand and foreign financial flows shocks, and fiscal redistribution in influencing poverty in developing countries. The analysis relies on an unbalanced panel dataset containing 90 developing countries over the period 1980–2014 and uses the two-step system GMM approach. Empirical results show that ERP influences positively poverty in developing countries, with the magnitude of this positive effect being the same for least developed countries (LDCs) and NonLDCs (countries not classified as LDCs in the sample). In addition, fiscal redistribution exerts a positive effect on poverty in developing countries, including in NonLDCs, but for LDCs, it leads to lower poverty rates. Interestingly, over the full sample, fiscal redistribution helps in reducing the magnitude of the positive effect of ERP on poverty. A further analysis has been performed by replacing ERP with a measure of terms-of-trade instability. Previous results are largely confirmed, with the exception that terms-of-trade instability exerts a higher positive effect on poverty in LDCs than in NonLDCs. Furthermore, while the positive poverty effect of terms-of-trade instability diminishes as the extent of fiscal redistribution rises, terms-of-trade instability leads to poverty reduction above a certain level of the extent of fiscal redistribution. Overall, these findings indicate that well-designed fiscal redistributive measures could help governments mitigate the adverse effects of external economic and financial shocks on poverty in developing countries.

**Keywords** Exchange rate pressure · Fiscal redistribution · Poverty

**JEL Classification** F31 · F14 · F32 · H22 · I32

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✉ Sèna Kimm Gnanon  
kgnangnon@yahoo.fr; SenaKimm.Gnanon@wto.org; kignangnon@gmail.com

<sup>1</sup> World Trade Organization, Rue de Lausanne 154, 1211 Geneva 21, Switzerland

## 1 Introduction

Developing countries are highly prone to exogenous shocks (e.g. Guillaumont 2009; Essers 2013), including, for example, sharp fluctuations in the terms of trade, export demand, volatile financial flows, natural disasters, a good illustration of these being the 2007 global financial crisis and the food and fuel crises (e.g. Álvarez et al. 2018; Essers 2013; IMF 2008). The amplitude and frequency of such shocks are higher in low-income countries (LICs) or least developed countries (LDCs) than in advanced and emerging market countries (e.g. Cariolle et al. 2016; Dabla-Norris and Gündüz 2014; Guillaumont 2009; IMF 2011). Recently, Barrot et al. (2018) have investigated the effect of external structural shocks—demand, supply, monetary and commodity shocks—on economic growth in developing countries. They have found that the relative contribution of these shocks to macroeconomic fluctuations has increased in recent decades, while the incidence of domestic shocks has declined. A number of studies have looked at the effects of these shocks on poverty and reported that exogenous shocks, in particular negative shocks, tend to increase poverty, notably in developing countries and the poorest among them (e.g. Álvarez et al. 2018; Ahrend et al. 2011; Alexander 2010; 2005; Mendoza 2009; Ravallion 2009; Rewilak 2018; Sennoga and Matovu 2016). At the same time, the macroeconomic literature has discussed the social insurance role of the government (Rodrik 1998), including the redistributive function of the welfare state (including fiscal redistribution) notably for poverty reduction (e.g. Anderson et al. 2018; Higginsa and Lustiga 2016; Jouini et al. 2018; Kohler 2015; Lustig 2018; Luebker 2012; IMF 2014, 2017).

The current paper aims to contribute, on the one hand, to the existing literature on the effect of macroeconomic shocks on poverty in developing countries, and on the other hand to the literature on the effect of fiscal redistribution on poverty. By reconciling these two strands of the literature, the paper investigates in the first instance, the effect of export demand and foreign financial flows shocks—proxied by the exchange rate pressure (ERP)—on poverty in developing countries. In the second instance, it considers whether such an effect—if any at all—depends on the extent of fiscal redistribution.<sup>1</sup> The concept of exchange rate pressure is tightly linked to that of exchange market pressure (EMP) largely covered in the international finance literature, and which dates back to Girton and Roper (1977). The notion of EMP measures “the total pressure on an exchange rate, which has been resisted through foreign exchange intervention or relieved through exchange rate change” (e.g. Patnaik et al. 2017: p. 62). The ERP is, therefore, more generally defined as a weighted average of percentage changes of policy variables in response to current account or financial account shocks. As noted above, it has been widely used in the international financial literature (e.g. Aizenman and Hutchison 2012; Berg and Pattillo 1999; Kaminsky et al. 1998; Patnaik et al. 2017; Sachs et al. 1996), including as a

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<sup>1</sup> We would like to note here that while we expect fiscal redistribution to influence the effect of external shocks (measured by the exchange rate pressure) on poverty, we should not rule out the possibility that external shocks can also affect the size of fiscal redistribution, i.e. governments’ ability to redistribute income through taxes and transfers (e.g. Saijo 2020).

proxy for export demand and foreign capital flows shocks. More recently Morrissey et al. (2016) have used the ERP to examine tax revenue vulnerability to external shock in developing countries. We are not aware of any study that has examined the effect of ERP on poverty, even though some studies (see above) have looked at the effect of macroeconomic shocks, notably exogenous shocks on poverty (e.g. Acemoglu et al. 2003; Ahmed 2003; Alimi and Aflouk 2017; Bacchetta et al. 2009; Barrot et al. 2018; Broda 2004; Claudio 2004; Dabla-Norris and Gündüz 2014; Decaluwe et al. 1998; Easterly et al. 1993; Hnatkovska and Loayza 2005; Kose 2002; Kose and Riezman 2001; Loayza and Raddatz 2007; Mendoza 1995; Raddatz 2007; Ramey and Ramey 1995; Robilliard et al. 2002). The current study is the first one that addresses this topic, including by additionally examining whether fiscal redistribution enhances or reduces the effect of ERP on poverty. The study is closed in spirit to those studies that have examined empirically the effect of exogenous shocks on poverty. The analysis is carried out using a sample of 87 developing countries over the period 1980–2014. The empirical analysis, based on the two-step system generalized methods of moments (GMM), suggests that ERP leads to higher poverty rates, with this effect being more pronounced in poor countries, including least developed countries than in non-poor countries in the full sample. Additionally, the findings indicate that a higher extent of fiscal redistribution helps in reducing the increasing poverty effect of ERP, and beyond a certain level of fiscal redistribution, ERP is associated with poverty reduction.

The rest of the analysis is framed around five sections. Section 2 discusses how exchange rate pressure can influence poverty in developing countries. Section 3 presents the model specification that allows addressing the questions raised in the article. Section 4 discusses the appropriate econometric estimator to estimate the model laid down in Sect. 3. Section 5 interprets the empirical results. Section 6 undertakes an additional analysis, and Sect. 6 concludes.

## 2 Discussion on the effect of exchange rate pressure and fiscal redistribution on poverty

We postulate that external shocks, in particular negative shocks, to export demand (terms-of-trade fluctuations or significant changes in volumes of exports) and/or to foreign capital flows (for example, the global financial crises, or sudden reversals of capital inflows) could affect households and hence poverty rates through several channels. These include lower access to credit; erosion of savings and asset values (financial market channel); reduced employment; wages and remittances (labour markets channel); lower economic growth and production, and relative price changes (product markets channel); lower and/or rationalization of public spending on education; health and social protection services—due, *inter alia*, to lower development aid flows to developing countries and poorest among them—(e.g. Mendoza 2009; Sennoga and Matovu 2016). For example, shocks could directly affect households by reducing their income as they would lose jobs and experience lower employment and entrepreneurship opportunities, and lesser access to credit. These would translate into lower purchasing power for basic goods, weaker public

goods and service provision (e.g. Mendoza 2009), impoverish the population and ultimately lead to higher poverty rates. In the absence of coping mechanisms such as fiscal redistributive policies to help absorb the adverse effects of shocks on households, the subsequent rise in poverty would generate under-investment on human capital (notably education and health), which could induce higher mortality rates, and result in intergenerational transmission of poverty. According to Schmitt-Grohé and Uribe (2018), commodity prices are channels through which shocks (including export demand and financial shocks) propagate. The Harberger–Laursen–Metzler (HLM) (see Harberger 1950; Laursen and Metzler 1950) hypothesis provides that a negative terms-of-trade shock (a decline of export prices relative to import prices) generates lower real income in the short term. This could increase poverty, particularly in commodity-dependent countries. Meanwhile, an improvement in terms of trade also negatively affects real income through its negative effect on domestic output (as such an improvement makes imports relatively cheaper and exports relatively more expensive). It follows that the direct effects of a change in terms of trade on real income move in opposite direction to the effects of the induced change in output and ultimately makes the overall impact on real income unknown (see Jacquet et al. 2017). Nevertheless, what genuinely matters is the nature of shocks, i.e. whether they are temporary or permanent, expected or not, and this nature of shocks are difficult to predict ex-ante (see Jacquet et al. 2017 for a detailed analysis on this specific point). This, therefore, makes it difficult to anticipate the effect of terms-of-trade shocks on real income, and hence on poverty. In addition, the effects of a negative terms-of-trade shock (or terms-of-trade instability) within a country are not equally spread across different segments of the population. For example, producers of natural resources would be adversely affected by a negative shock on export prices, while urban inhabitants could benefit from such a shock. Moreover, access to credit could become much more difficult for small-sized firms than for bigger ones.

From an empirical perspective, a number of studies have examined the effect of financial crises (and hence, the resulting declining foreign capital inflows) on poverty. For example, Dollar and Kraay (2002) have noted that if increases in the average income growth are associated with like-for-like increases in the income growth of the poor, the poor will be harmed with lower incomes during crisis episodes. In the meantime, Baldacci et al. (2002) have indicated that poorest in the society might not be affected by the burden of financial crises as they do not own property, or other tangible assets. Gerry et al. (2014) have shown that when the poor experience negative income shocks due to crises and higher food prices, mortality rates could increase as their nutritional levels could fall and their health levels deteriorate. Chen and Ravallion (2009) have reported that the 2007 financial global crisis would increase the number of people living below \$1.25 a day globally by 53 million people, and even though the aggregate poverty rates were still expected to fall over time, they would do so at a slower rate. Along the same lines, Habib et al. (2010) have uncovered a slowdown in poverty reduction in the Philippines and a rise in poverty in Mexico, further to the 2007 global financial crisis. Rewilak (2018) has studied the effect of financial crises on poverty and obtained evidence that the most harmful types of crises to the poor are currency crises. The latter is followed by banking crises, and debt crises only affect poor's income in richer countries. These adverse

effects of financial crises on poverty materialize through various factors, including, for example, severe economic downturns and higher unemployment rates.

As noted above, the effect of external shocks on poverty could also take place through economic growth and production. For example, a number of studies<sup>2</sup> have reported that macroeconomic volatility (induced by shocks such as terms-of-trade swings) has detrimental effects on growth and business cycles in developing countries. Some other studies have also documented the adverse welfare effects of macroeconomic volatility on welfare in developing countries, and that this adverse effect is even more pronounced in poor countries (e.g. Acemoglu et al. 2003; Dabla-Norris and Gündüz 2014; Hnatkovska and Loayza 2005; Ramey and Ramey 1995). In their study on the effect of external structural shocks (demand, supply, monetary and commodity shocks) on economic growth in developing countries, Barrot et al. (2018) have obtained that in the short-run, real and financial openness have induced a higher contribution of external shocks to economic volatility, while at longer horizons, financial openness lowers the volatility contribution of global real shocks, but increases the relative role of global monetary shocks. Additionally, commodity-intensive countries show high vulnerability of the volatility of the gross domestic product (GDP) to all types of external shocks, not just commodity shocks. Álvarez et al. (2018) have obtained evidence that positive terms-of-trade shocks, especially the rise in mineral prices in Chile between 2003 and 2009, have resulted in poverty reduction in the municipalities exposed to this commodity boom, notably through higher wages and employment, especially for unskilled workers and workers employed in metal-mining industries. Some studies (e.g. Claudio 2004; Decaluwe et al. 1998; Robilliard et al. 2002), based on computable general equilibrium (CGE) and micro-simulation models, have examined the impact of macroeconomic shocks on households across the entire income distribution. They have reported that macroeconomic volatility reduces economic growth.

The literature has also underlined the adverse social consequences of terms-of-trade shocks (for example, in terms of higher poverty rates, higher crimes and deterioration of human development) (e.g. Bredenkamp and Bersch 2012; Guillaumont and Puech 2005; Nkurunziza et al. 2017). Ivanic and Martin (2008) have shown that global food prices shocks (i.e. the large increases in food prices in 2005–2007) have substantially raised overall poverty in low-income countries. This is due to the fact that roughly three-quarters of poorest people's incomes is spent on staple foods (Cranfield et al. 2007), although farm households (which is one of the poorest groups in low-income countries) may enjoy a higher income further to a rise in commodity prices (Hertel et al. 2004; Estrades and Terra 2012). In the same vein, Moncarz et al. (2018) have reported evidence that international prices of agricultural commodities have exerted a significant negative effect on welfare and substantially raised poverty.

<sup>2</sup> These include, for example, Ahmed (2003); Alimi and Aflouk (2017); Bacchetta et al. (2009); Broda (2004); Easterly et al. (1993); Kose (2002); Kose and Riezman (2001); Loayza and Raddatz (2007); Mendoza (1995); and Raddatz (2007).

In light of the foregoing, we argue that exchange rate pressure could ultimately result in higher poverty rates, especially in poor countries that lack appropriate coping strategies.

Let us now discuss the effect of fiscal redistribution on poverty. The extent of fiscal redistribution through transfers and taxes depends on the magnitude of taxes and transfers and their progressivity (e.g. IMF 2017: p. 6). Fiscal redistribution could be implemented through progressive direct taxes and transfers, consumption taxes and through in-kind transfers spending. The key question here is whether fiscal redistribution has been successful in reducing poverty. The empirical evidence of the effect of fiscal redistribution on poverty is mixed. For example, Anderson et al. (2018) have found no clear evidence that higher government spending has played an important role in income poverty reduction in low-and middle-income countries. They have also reported that government spending has exerted a lesser negative effect on poverty in Sub-Saharan Africa and more negative effect for countries in Eastern Europe and Central Asia, compared to other regions. Higgins and Lustiga (2016) have shown that the analyses of the effect of fiscal redistribution on poverty that involve comparing poverty before and after taxes and transfers have failed to capture an important aspect, which was that a substantial proportion of the poor are made poorer (or non-poor made poor) by the tax and transfer system. Using a set of seventeen developing countries, they have obtained that the fiscal system is poverty-reducing and progressive in fifteen of these countries, while in ten of these, at least one-quarter of the poor pay more in taxes than they receive in transfers, phenomenon, which they have qualified as ‘fiscal impoverishment’ Lustig (2018). has reported, for twenty-nine low- and middle-income countries, that although fiscal policy always reduces inequality, this is not the case with poverty. Jouini et al. (2018) have explored the effect of the Tunisia’s tax and transfer system on inequality and poverty, and found that fiscal redistribution reduces significantly inequality and extreme poverty. However, the analysis based on the national poverty line has shown that fiscal redistributive fiscal policy has led to a rise in the headcount poverty ratio. The authors have concluded that a large number of the poor people pay more in taxes than they receive in cash transfers and subsidies. They have explained this finding by a relatively high burden of personal income taxes and social security contributions for low-income households. Against this background, it would be difficult to anticipate the effect of fiscal redistribution on poverty in developing countries, as it could be positive or negative.

Overall, while we could expect a positive effect of external shocks on poverty, it is not clear whether fiscal redistribution would reduce or increase poverty, as the issue is an empirical matter. In the meantime, we could expect fiscal redistribution to help reduce the positive effect of ERP on poverty, and even induce a negative effect of ERP on poverty. This could particularly be the case in poor countries if the latter received higher amounts of development aid during periods of external crises. In fact, Dabla-Norris et al. (2015) have obtained empirical evidence that while development aid inflows could decline sharply when donor-countries experience severe economic downturns, these inflows increase significantly when recipient-countries experience large adverse shocks. The authors have, therefore, concluded

that development aid may play an important mitigating role in developing countries, but only in times of severe macroeconomic stress.

### 3 Model specification

To explore empirically how exchange rate pressure and fiscal redistribution interact in influencing poverty rate in developing countries, we consider a model that builds on existing studies on the macroeconomic determinants of poverty (e.g. Bergh and Nilsson 2014; Fosu 2018; Gngangnon 2019; Kiendrebeogo and Minea 2016; Kpodar and Singh 2011; Lacalle-Calderon et al. 2018; Le Goff and Singh 2014; Santos-Paulino 2017; Singh and Huang 2015).

The model postulated is as follows:

$$\begin{aligned} POVERTY_{it} = & \alpha_0 + \alpha_1 POVERTY_{it-1} \\ & + \alpha_2 ERP_{it} + \alpha_3 FISCREd_{it} + \alpha_4 \text{Log}(GDPC)_{it} \\ & + \alpha_5 \text{Log}(OPEN)_{it} + \alpha_6 FD_{it} + \alpha_7 FO_{it} + \alpha_8 EDU_{it} \\ & + \alpha_9 POLITY2_{it} + \alpha_{10} INFL_{it} + \alpha_{11} TREND + \mu_i + \omega_{it} \end{aligned}$$

where  $i$  stands for a given country, and  $t$  represents the time period. The analysis has used a panel dataset of 87 countries over the period 1980–2014, based on data availability. In particular, we use non-overlapping sub-periods of 5-year average data so as to obtain medium term effects of variables under analysis. These sub-periods are 1980–1984; 1985–1989; 1990–1994; 1995–1999; 2000–2004; 2005–2009; and 2010–2014.  $\alpha_0$  to  $\alpha_{11}$  are coefficients to be estimated.  $\mu_i$  stand for countries' fixed effects;  $\omega_{it}$  is an idiosyncratic error term. "Trend" is a trend<sup>3</sup> variable, which captures the trend displayed by the dependent variable over time. The description and source of all variables contained in model (1) are provided in Table 5 of Appendix. Descriptive statistics on these variables are displayed in Table 6 of Appendix, and the list of countries used in the analysis is reported in Table 7 of Appendix.

The dependent variable "POVERTY" is measured by the headcount index of poverty rate, which is also widely used in the empirical analyses of the macroeconomic determinants of poverty. It represents the absolute poverty that indicates the percentage of the population living with consumption or income per person below a certain poverty line, in particular, the percentage of the population living on less than \$1.90 a day at 2011 international prices (see Gngangnon 2019 for a discussion on the rationale for the choice of this indicator as the measure of poverty rate). Following several previous empirical studies, we have included the one-period lag of the poverty variable in model (1) in order to account for the persistence of poverty rates over time, that is, its state dependence nature.

<sup>3</sup> It is worth noting that we included time dummies in model (1), but they were not statistically significant (at the 10% level) in the regressions, probably because the exchange rate pressure already captures the effect of shocks on countries. Therefore, we decide to remove time dummies from the model specification, but to include a "Trend" variable in the model.

The variable “ERP” represents the transformed measure of the exchange rate pressure. This transformation has been made using the technique proposed by Yeyati et al. (2007) (see also Morrissey et al. 2016).  $ERP = \text{sign}(PI) * \log(1 + |PI|)$ , where  $|PI|$  refers to the absolute value of the exchange rate pressure index, denoted “PI”, and where

$$PI_{it} = w_{E,i} \frac{\Delta E_{it}}{E_{i,t-1}} - w_{RES,i} \frac{\Delta RES_{it}}{RES_{i,t-1}} \quad (2)$$

“ $E$ ” is the exchange rate in local currency units per USD; “ $RES$ ” is the size of reserves,  $w_{E,i}$  and  $w_{RES,i}$  are country-specific weights:

$$w_{E,i} = \frac{\sigma_{RES,i}}{\sigma_{RES,i} + \sigma_{E,i}} \quad \text{and} \quad w_{RES,i} = \frac{\sigma_{E,i}}{\sigma_{RES,i} + \sigma_{E,i}} \quad (3)$$

$\sigma_{RES,i}$  stands for the standard deviation of  $\frac{\Delta RES_{it}}{RES_{i,t-1}}$  over the full period of the analysis (here, 1980–2014). Similarly,  $\sigma_{E,i}$  is the standard deviation of  $\frac{\Delta E_{it}}{E_{i,t-1}}$  over the full period of the analysis (here, 1980–2014). The variable “PI” has been computed using the annual data over the period 1980–2014. Higher values of the “ERP” variable reflect higher levels of external shocks, while lower values of this index indicate lower level of external shocks. The rationale for formula (2) is that a country could employ different strategies in response to an adverse balance of payment shock: it could devalue the currency, or use its international reserves to defend the exchange rate (Morrissey et al. 2016). The weights in Eq. (2) are country-specific and have been chosen so as to allow the smaller weight to the more volatile series. The two components of Eq. (2) should be considered as measure of the magnitude of external shocks (see Morrissey et al. 2016).

The variable “FISCREd” is the indicator of the extent of fiscal redistribution through taxes and transfers. It is calculated as the difference between the market income Gini (Gini of incomes before tax and transfers) and the net income Gini (Gini of incomes after tax and transfers) (e.g. Milanovic 2000; Iversen and Soskice 2006; Grundler and Kollner 2017; Berg et al. 2018; Gozgor and Ranjan 2017; Kamasas and Sarantides 2019). Values of the Gini indices range between 0 and 100, and higher values indicate a more unequal income distribution.

The real per capita income variable “GDPC” has been introduced in model (1) to capture countries’ development levels, i.e. how the development level influences poverty rates. In model (1), we have applied the natural logarithm to this variable in order to reduce its high skewness. Following the above-mentioned literature on the macroeconomic determinants of poverty, we expect the rise in the development level to be negatively associated with poverty rates.

Concerning the openness variable (“OPEN”), we would like to note that the literature has usually measured trade openness (De Facto trade openness) by the ratio of the sum of exports and imports of goods and services to the gross domestic product (GDP), also referred to as ‘trade share’. However, in the current analysis, we have preferred to use the ‘De Facto’ measure of trade openness proposed by Squalli and Wilson (2011) (see Table 5 of Appendix). It has been calculated as the trade share



indicator adjusted by the proportion of a country's trade level relative to the average world trade (see Squalli and Wilson 2011: p. 1758). Compared to the trade share indicator, the Squalli and Wilson (2011)'s indicator has the advantage of providing a good indication of the degree of countries' integration into the global trade market. While the analysis is conducted using the Squalli and Wilson (2011)'s indicator of trade openness, the results (that could be obtained upon request) do not qualitatively change when we use alternatively the standard measure of trade openness, i.e. the trade share indicator. Let us now discuss the expected effect of trade openness on poverty. According to the standard international trade theory, trade liberalization (as well as trade openness) could improve economic welfare through several channels, of which greater specialization, investment in innovation, better resource allocation and higher productivity. Specifically, the theoretical literature<sup>4</sup> has provided that trade liberalization could influence poverty through various channels, including the transmission of prices from the border down to the household, its effects on profits, wages and employment, its effects on government revenue and pro-poor expenditure, and its effects on the riskiness of households' livelihoods (see McCulloch et al. 2001, p. 65). Other studies such as Le Goff and Singh (2014) have emphasized the role of higher economic growth rates and lower inequality in reducing poverty. On the empirical front, the results are mixed, as positive, negative or lack of significant effect of trade openness on poverty have been found. For example, Dollar and Kraay (2004) and Kpodar and Singh (2011) have reported the lack of significant impact of trade liberalization on poor people in developing countries, while studies such as Guillaumont-Jeanneney and Kpodar (2011), and Singh and Huang (2015) have obtained a negative effect of trade liberalization on poverty. Le Goff and Singh (2014) have suggested that trade openness reduces poverty in African countries that experience a high depth of financial development, higher education levels and strong institutions. Nicita et al. (2018) have obtained for six Sub-Saharan African (SSA) countries (Burkina Faso, Cameroon, Côte d'Ivoire, Ethiopia, Gambia and Madagascar) whose trade policies tend to be biased in favour of poor households, as these policies redistribute income from rich to poor households. Bergh and Nilsson (2014) and Mahadevan et al. (2017) have uncovered a positive effect of trade liberalization on poverty. Overall, the effect of trade openness on poverty remains an empirical issue. In model (1), we have also applied the natural logarithm to the trade openness variable in order to reduce its high skewness.

For the other control variables, following, for example, Ngangnon (2019), the variable capturing the level of human capital accumulation, and proxied by the education level is expected to influence negatively poverty headcount rates. In fact, higher education could allow people to find better jobs and improve their living conditions, including by enjoying higher earnings. Similarly, we expect improvements in institutional quality, proxied here by the degree of democratization of a given country, to facilitate the implementation of pro-poor economic and social policies.

<sup>4</sup> McCulloch et al. (2001); Winters et al. (2004); Winters and Martuscelli (2014), and Pavcnik (2014) have provided a detailed theoretical literature on the impact of trade liberalization on poverty.

The variable measuring the depth of financial development (“FD”) has been computed as a composite index of four indicators of financial development, which are the liquid liabilities (% GDP); the private credit by deposit money banks and other financial institutions (% GDP); the bank deposits (% GDP); and the financial system deposit (% GDP). Following, for example, Ang and McKibbin (2007), Huang (2010) and David et al. (2014), this index has been calculated by relying on the factor analysis approach, including the principal component analysis that allows to extract a common factor from the above-mentioned four indicators of financial development. In terms of expected effect, Kpodar and Singh (2011) have argued that depending on the level of the institutional development, banks may be willing to address the information asymmetries in the markets by providing poor households with a better access to credit, helping them to manage their risks through access to cheaper financial instruments or finance the expansion of more firms that would be using their skills. Studies such as Burgess and Pande (2005), Beck et al. (2007), Kiendrebeogo and Minea (2016) and Rewilak (2017) have found that higher financial development results in poverty reduction. Therefore, we could expect that a rise in the depth of financial development could result in lower poverty rates. However, if financial development induced higher financial instability, it could be associated with higher poverty levels (e.g. Akhter and Daly 2009; Guillaumont-Jeanneney and Kpodar 2011).

The financial openness variable (denoted “FO”) has been introduced in model (1) because financial openness (or capital account liberalization) could potentially influence the effect of “ERP” on poverty (this is because greater financial openness exposes countries to external financial shocks). The literature on the effect of financial openness on poverty is not abundant. For example, Arestis and Caner (2010) have examined the relationship between the capital account dimension of financial liberalization and poverty for developing countries for the period 1985–2005. They have reported no significant effect of the degree of capital account liberalization on the poverty rate. At the same time, the authors have found that greater capital account liberalization generates a lower income share for the poor.

Finally, the inflation rate, denoted “INFLATION”, has been introduced in model (1) to control the effect of macroeconomic stability on poverty. In fact, higher inflation rates could result in lower purchasing power of people, and hence increase the poverty level. To also reduce the high skewness of the inflation rate variable, it has been transformed into the variable denoted “INFL”, using the method of Yeyati et al. (2007), which has also been applied above to the variable “PI” (see also Table 5 of Appendix).

#### 4 Econometric strategy

To start with, we estimate a static specification of model (1), i.e. model (1) without the one-period lag of the “POVERTY” variable by using three standard econometric estimators. These include the pooled ordinary least squares (denoted “POLSDK”) and the within fixed effects estimator (denoted “FEDK”); for both estimators, standard errors of estimates have been corrected for serial correlation,

**Table 1** Impact of exchange rate pressure (ERP) on poverty

Variables	POLSDK Poverty (1)	FEDK Poverty (2)	FGLS Poverty (3)
<i>Estimators: POLSDK, FEDK and FGLS</i>			
ERP	5.650** (2.603)	3.497*** (1.096)	3.501*** (0.733)
FISCREd	-0.607 (0.395)	1.843*** (0.274)	-0.733*** (0.171)
Log(GDPC)	-10.98*** (0.454)	-18.63*** (4.005)	-12.80*** (0.525)
Log(OPEN)	0.714*** (0.172)	0.846 (1.009)	0.734*** (0.211)
FD	-0.108*** (0.0163)	-0.00893 (0.0178)	-0.0978*** (0.00879)
FO	0.000258 (0.0403)	0.0433*** (0.0155)	0.0235*** (0.00840)
EDU	-0.160*** (0.00911)	0.00707 (0.0266)	-0.140*** (0.0106)
POLITY2	0.0154 (0.175)	-0.341** (0.144)	-0.0200 (0.0596)
INFL	-0.175 (0.394)	-0.616 (0.439)	-0.112 (0.168)
TREND	0.256 (0.316)	-1.549** (0.644)	0.219 (0.179)
Constant	149.7*** (2.901)	176.2*** (32.64)	158.7*** (4.459)
Observations-countries	355–87	355–87	346–78
<i>R</i> -squared	0.6534		
Within <i>R</i> -squared		0.5026	
Pseudo <i>R</i> -squared			0.8063

\**p* value < 0.1; \*\**p* value < 0.05; \*\*\**p* value < 0.01. Robust Standard Errors are in parenthesis. The Pseudo  $R^2$  has been calculated for the regression based on the FGLS estimator, as the correlation coefficient between the dependent variable and its predicted values

heteroscedasticity and cross-sectional dependence in the error term by the technique suggested by Driscoll and Kraay (1998). The third estimator is the feasible generalized least squares (denoted “FGLS”). These three estimators allow getting a first insight into the effect of exchange rate pressure on poverty. The results of these estimations are provided in Table 1. However, it is likely that these estimates would be biased for several reasons. Many regressors are likely endogenous, due, in particular, to the reverse causality from the dependent variable to each of these regressors. These regressors include the extent of fiscal redistribution, the depth of financial development, the degree of openness to international trade, the education

level and the institutional quality. For example, while we expect fiscal redistribution, through taxes and transfers to influence poverty, government could also endeavour to increase the scope available for fiscal redistribution if they experienced a rising level of poverty. Similarly, while trade openness could influence poverty, a high poverty rate could induce governments to further open-up their economies with a view to taking full advantage of international trade so as to reduce poverty. They can also opt for restricting trade openness if the latter is source of external shocks that could increase poverty rates. The same logic applies to the other variables. In addition to the reverse causality issue, the absence of the one-period lag of the dependent variable in the static specification of model (1) could introduce an omitted variable bias, which poses another endogeneity concern. Even estimating the dynamic model (1) (i.e. as it stands) using these standard three estimators would likely introduce an endogeneity bias because of the correlation between this lagged variable and countries' specific effects. This referred to the so-called Nickell bias (see Nickell 1981), which is severe in panel dataset with small time dimension and large cross-sectional dimension.

We address these endogeneity concerns by estimating model (1) (as well as all its variants described below) using the generalized methods of moments (GMM) approach proposed by Blundell and Bond (1998). This estimator combines the equation in differences with the equation in levels where, respectively, lagged first differences are used as instruments for the levels equation and lagged levels are used as instruments for the first-difference equation. The variables “FD”, “FISCRED”, “FO”, “OPEN”, “EDU” and “POLITY” have been considered as endogenous.

The empirical analysis that uses the two-step system GMM approach proceeds as follows. First, we estimate the dynamic model (1) over the full sample, and results of this estimation are provided in column [1] of Table 2. We then check whether there is a nonlinear effect of exchange rate pressure on poverty by estimating another specification of model (1) that includes the square term of the exchange rate pressure variable. If we find a nonlinear effect whereby the effect of the exchange rate pressure on poverty is positive only after a threshold of “ERP” variable, then this model specification (with the square term of the exchange rate pressure variable) becomes our baseline model. In contrast, if we obtain a nonlinear effect of the exchange rate pressure on poverty whereby, for example, the coefficients of both the “ERP” variable and its square term are positive and statistically significant—which means that additional shocks would more than further enhance the positive effect of exchange rate pressure on poverty—then we will consider the model (1) (as it stands) as our baseline model for the rest of the analysis. The results of this estimation are provided in column [2] of Table 2. The rest of empirical analysis entails the estimation of another variant of model (1) that allows examining whether there is a differentiated effect of exchange rate pressure on poverty in poorest countries versus non-poorest countries. We have considered least developed countries (LDCs) as poorest countries. In fact, based on a number of criteria,<sup>5</sup> the United Nations have defined a

<sup>5</sup> These criteria as well as other information concerning the group of LDCs could be obtained online at: <https://unohrrls.org/about-ldcs/>.

**Table 2** Impact of exchange rate pressure (ERP) on poverty

Variables	Poverty (1)	Poverty (2)	Poverty (3)	Poverty (4)
<i>Estimator: Two-step system GMM</i>				
POVERTY <sub>t-1</sub>	0.734*** (0.0156)	0.729*** (0.0161)	0.710*** (0.0184)	0.725*** (0.0136)
ERP	5.623*** (0.419)	9.094*** (1.352)	5.830*** (0.611)	5.802*** (0.310)
ERP <sup>2</sup>		4.759** (1.914)		
FISCRED	0.488*** (0.0473)	0.414*** (0.0531)	0.383*** (0.0719)	0.441*** (0.0564)
ERP*LDC			-1.764 (1.568)	
FISCRED*LDC				-1.325*** (0.0718)
LDC			5.439*** (0.902)	6.683*** (0.594)
Log(GDPC)	-2.048*** (0.439)	-2.129*** (0.449)	-1.946*** (0.432)	-1.376*** (0.253)
Log(OPEN)	-0.967*** (0.239)	-1.029*** (0.277)	-0.767*** (0.295)	-0.884*** (0.156)
FD	-0.0206*** (0.00429)	-0.0220*** (0.00530)	-0.0167*** (0.00583)	-0.0178*** (0.00440)
FO	0.0316*** (0.00803)	0.0353*** (0.00873)	0.0436*** (0.00877)	0.0472*** (0.00456)
EDU	-0.0207*** (0.00804)	-0.0211** (0.00843)	0.000181 (0.00945)	0.000295 (0.00616)
POLITY2	-0.442*** (0.0459)	-0.423*** (0.0485)	-0.451*** (0.0526)	-0.423*** (0.0362)
INFL	1.182*** (0.107)	1.188*** (0.119)	1.261*** (0.124)	1.282*** (0.0824)
TREND	-0.391*** (0.0513)	-0.411*** (0.0487)	-0.878*** (0.102)	-1.063*** (0.0871)
Constant	15.95*** (5.198)	16.72*** (6.018)	14.10*** (5.336)	8.936*** (2.519)
Observations-countries	322–87	322–87	322–87	322–87
Number of instruments	79	80	80	89
AR1 ( <i>p</i> value)	0.0083	0.0065	0.0057	0.0069
AR2 ( <i>p</i> value)	0.1864	0.1991	0.1882	0.1932
AR3 ( <i>p</i> value)	0.5319	0.6152	0.5151	0.6002
Sargan ( <i>p</i> value)	0.3806	0.3500	0.3252	0.4502

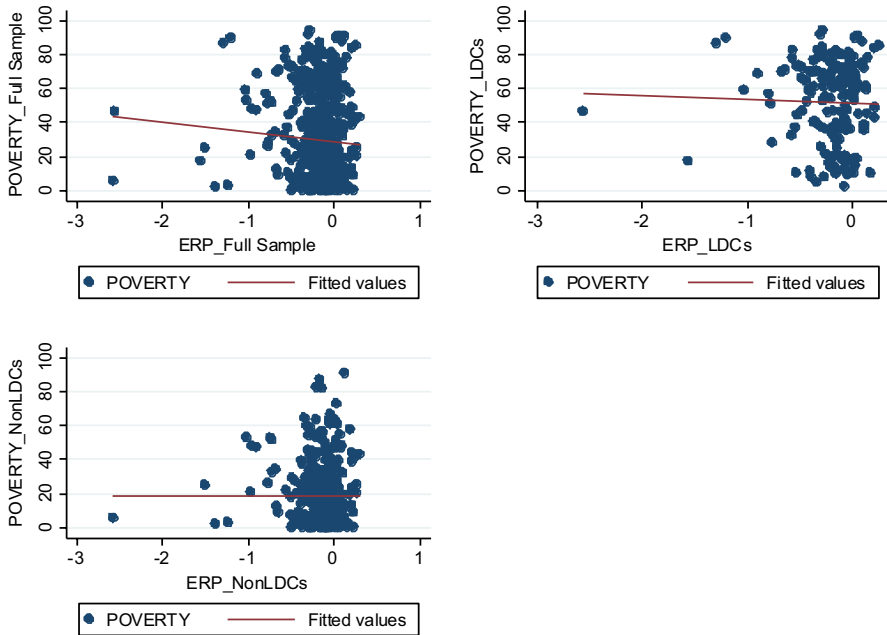
\**p* value < 0.1; \*\**p* value < 0.05; \*\*\**p* value < 0.01. Robust Standard Errors are in parenthesis. In the two-step system GMM estimations, the variables “FD”, “FISCRED”, “FO”, “OPEN”, “EDU” and “POLITY” have been considered as endogenous. The other variables have been considered as exogenous

**Table 3** Impact of exchange rate pressure (ERP) on poverty for varying levels of fiscal redistribution

Variables	Poverty (1)
<i>Estimator: Two-step system GMM</i>	
POVERTY <sub>t-1</sub>	0.732*** (0.0144)
ERP	6.201*** (0.425)
ERP*FISCRED	-0.316*** (0.108)
FISCRED	0.404*** (0.0444)
Log(GDPC)	-2.168*** (0.469)
Log(OPEN)	-0.894*** (0.262)
FD	-0.0215*** (0.00447)
FO	0.0340*** (0.00796)
POLITY2	-0.459*** (0.0469)
EDU	-0.0184** (0.00768)
INFL	1.177*** (0.110)
TREND	-0.398*** (0.0563)
Constant	17.26*** (5.669)
Observations-countries	322-87
Number of instruments	80
AR1 ( <i>p</i> value)	0.0080
AR2 ( <i>p</i> value)	0.1898
AR3 ( <i>p</i> value)	0.5522
Sargan ( <i>p</i> value)	0.3584

\**p* value < 0.1; \*\**p* value < 0.05; \*\*\**p* value < 0.01. Robust Standard Errors are in parenthesis. In the two-step system GMM estimations, the variables “FD”, “FISCRED”, “FO”, “OPEN”, “EDU” and “POLITY” have been considered as endogenous. The other variables have been considered as exogenous

set of countries (LDCs) as the poorest and most vulnerable (in the world) to environmental and external shocks. The list of LDCs used in the analysis is provided in Table 7 of Appendix. To carry out this analysis, we create a dummy variable,



**Fig. 1** Correlation pattern between ERP and POVERTY. *Source:* Author

denoted “LDC”—which takes the value one for LDCs, and zero, otherwise—and we interact this dummy variable with the variable “ERP” in model (1). The results of the estimations are provided in column [3] of Table 2. We apply the same method to examine whether there is a differentiated effect of fiscal redistribution on poverty in poorest countries versus non-poorest countries. The results of the estimations are provided in column [4] of Table 2. Finally, we investigate the extent to which the exchange rate pressure and fiscal redistribution interact in influencing poverty in developing countries. To do so, we estimate a variant of model (1), which includes a variable capturing the interaction between the variables “ERP” and “FISCRED”. The outcomes of this estimation are displayed in Table 3.

Before turning to the interpretation of the estimates, we find it useful to present in Fig. 1 the scatter plot between the variables “ERP” and “POVERTY”, over the full sample, as well as over the sub-samples of LDCs and NonLDCs (i.e. countries of the full sample that are not in the category of LDCs). It could be observed from Fig. 1 that over the full sample, the correlation between exchange rate pressure and poverty is negative, while for LDCs, the correlation pattern is slightly negative. However, the correlation pattern is unclear for NonLDCs. The negative correlation patterns for the full sample and LDCs do not signify a negative causal effect of exchange rate pressure on poverty, as the latter would be determined by the empirical analysis based on model (1).

## 5 Interpretation of empirical results

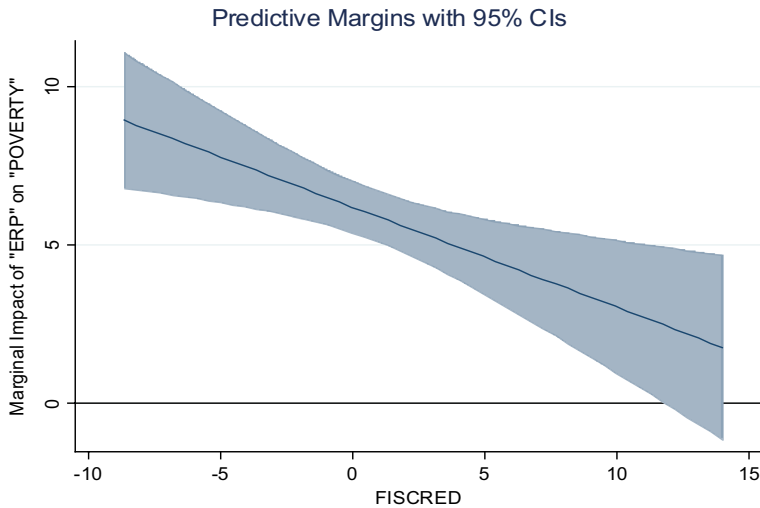
Results in Table 1 suggest that at least at the 5% level, exchange rate pressure exerts a positive and significant effect on poverty. The magnitudes of this effect are similar for results based on the FEDK and FGLS estimators and amount to 3.5, but the latter is lower than the one obtained from the POLSDK-based regression (it amounts here to 5.65). Based on the outcomes in columns [2, 3], we conclude that over the full sample, a rise in the ERP index by 1% is associated with a 3.5% points increase in the poverty headcount index. In addition, across the three columns of the Table, the coefficients of the variable capturing fiscal redistribution exhibit different signs and statistical significance at the conventional levels. This IS also the same for the control variables. As noted above, it is likely that these results be biased because of several endogeneity concerns discussed in the previous section. Therefore, we rely on the estimates based on the two-step system GMM estimator, which are reported in Tables 2 and 3. The results related to the diagnostic tests that allow checking the validity of the two-step system GMM estimator include the Arellano–Bond test of first-order serial correlation (AR(1)) in the error term; the Arellano–Bond test of no second-order autocorrelation (AR(2)) in the error term; and the standard Sargan test of over-identifying restrictions, which determines the validity of the instruments used in the regressions. We also display the outcomes of the “no third-order autocorrelation (AR(3))” in the error term, as the presence of serial correlation in the error term at the third-order might reflect a problem of omitted variable. The number of instruments used in the regressions is also reported, as if it is higher than the number of countries, these diagnostic tests may lose power (e.g. Roodman 2009). The results of the outcomes that help assess the validity of the two-step system GMM are presented at the bottom of columns of Tables 2 and 3. We note across these columns of the Tables that the coefficient of the one-period lag of the dependent variable is positive and statistically significant at the 1% level, which highlights the relevance of considering the dynamic model (1) in the analysis, and suggests that the existence of a mean reversion in the poverty headcount index. The results associated with these diagnostic tests are reported at the bottom of relevant columns of Tables 2 and 3. It could be observed that the  $p$  values associated with the AR(1) are lower than 0.05, and the  $p$  values relating to AR (2) and AR (3) tests are higher than 0.10. Additionally, the  $p$  values associated with the Sargan test are all higher than 0.10. The number of instruments is consistently lower than the number of countries across all columns of the two Tables. All these outcomes confirm the consistency of the two-step system GMM approach for carrying out the empirical analysis.

We now turn to the estimates reported in columns [1–4] of Table 2. Results in column [1] suggest that exchange rate pressure generates a rise in the poverty headcount rate. A 1% increase in the EPR index induces a 5.6% points rise in the poverty headcount index. The magnitude of this positive poverty effect of the exchange rate pressure is slightly higher than the one obtained in columns [2, 3] of Table 1 (results based on the FEDK and FGLS estimators). At the same time, we obtain in column [1] of Table 2 that fiscal redistribution induces higher poverty rates (at the 1% level), outcome that may reflect the existence of differentiated effects of fiscal



redistribution on poverty rates across countries in the full sample. Nevertheless, one could interpret this result by the fact that redistribution using fiscal policy instruments in developing countries might not be always in favour of poor people. Specifically, over the full sample, a one-point increase in the index of fiscal redistribution is associated with 0.5-point increase in the index of poverty rate. While the positive and significant effect of fiscal redistribution on poverty is confirmed in column [3] of Table 2, results in the same column show that the coefficients of both ERP and its squared term are positive and statistically significant at the 1% level. These suggest that not only does the ERP induces higher poverty headcount rates in developing countries, but the enhancing poverty effect of shocks is amplified by further shocks. For example, a 1% increase in the ERP index induces a 5.2 ( $=4.759+0.414$ ) percentage points increase in the poverty headcount index. Results displayed in column [4] suggest a non-statistically significant coefficient of the interaction variable ["LDC\*ERP"], while the coefficient of the "ERP" variable is positive and significant at the 1% level (with a magnitude similar to the one in column [1]). Therefore, we conclude that exchange rate pressure affects positively and significantly poverty in LDCs and NonLDCs alike. These signify that external shocks induce a high poverty incidence in both LDCs and NonLDCs. Finally, estimates provided in column [4] indicate that fiscal redistribution exerts a higher negative effect on poverty headcount in LDCs than in NonLDCs. This is exemplified by the negative and statistically significant (at the 1% level) interaction term associated with the interaction variable ["LDC\*FISCRED"]. Hence, the net effect of fiscal redistribution on poverty amounts to  $-0.88$  ( $=0.441-1.325$ ) and  $0.44$ , respectively, for LDCs and NonLDCs. In other words, fiscal redistribution reduces poverty in LDCs (a one-point increase in the index of fiscal redistribution is associated with a fall by 0.88-point in the index of poverty rate in LDCs), but increases poverty in NonLDCs (a one-point increase in the index of fiscal redistribution is associated with a 0.44-point increase in the index of poverty rate in NonLDCs). This difference on the effect of fiscal redistribution in LDCs and NonLDCs can be difficult to explain at the current analysis. For example, it may be explained by the design (or nature) of fiscal redistribution in each country within each of these two categories, but the results may also hide differentiated effects of fiscal redistribution on poverty across countries in each group of countries. For example, as found by Jouini et al (2018) for Tunisia (which is a NonLDC), fiscal redistribution has led to a rise in poverty headcount ratio, result that likely reflects the fact that more taxes are paid by a large number of poor people than they receive in cash transfers and subsidies. Lustig (2017: p. 33) has noted that in assessing specific impact of fiscal interventions, it is important to adopt a co-ordinated view of both taxation and spending rather than pursuing a piecemeal analysis.

Results concerning control variables are quite similar across the four columns of Table 2. As expected, we obtain that a rise in the real per capita income, higher level of trade openness, higher depth of financial development, lower degree of financial openness, improvement in the level of education, better institutional quality and lower inflation rates are associated with poverty reduction. The "TREND" variable exhibits a negative and statistically coefficient, thereby suggesting that poverty in developing countries has been declining over time.



**Fig. 2** Marginal Impact of “ERP” on “POVERTY” for varying levels of fiscal redistribution. *Source:* Author

We now consider the estimates reported in Table 3. It is worth recalling that the purpose of these results is to examine how exchange rate pressure and fiscal redistribution interact in influencing poverty in developing countries, i.e. whether fiscal redistributive policies help reduce the positive effect of the exchange rate pressure on poverty. The key coefficients of interest are the coefficient of the variable “ERP” and the interaction term related to the interaction variable [“ERP\*FISCREd”]. We find that the former is positive and statistically significant at the 1% level, while the latter is negative and statistically significant at the 1% level. Taken together, these two results suggest that as the extent of fiscal redistribution increases, the magnitude of the positive effect of exchange rate pressure on poverty diminishes, and there is a turning point of the index of fiscal redistribution above which the effect of exchange rate pressure on poverty headcount becomes negative. This threshold (turning point) amounts to 19.6 ( $=6.201/0.316$ ). According to descriptive statistics reported in Table 6 of Appendix, we note that values of the index of fiscal redistribution range between  $-8.62$  and 14. As the threshold value 19.6 is higher than the maximum value of “FISCREd”, we conclude that on average over the full sample, exchange rate pressure always induces a rise in poverty rate, but the magnitude of the positive poverty effect of exchange rate pressure diminishes as the extent of fiscal redistribution increases. In other words, the higher the extent of fiscal redistribution, the lower is the magnitude of the positive effect of exchange rate pressure on poverty. As these results represent ‘average’ effects over the full sample, they might not provide a full picture of how exchange rate pressure affects poverty for different levels of fiscal redistribution. This is because the effects described above could indeed vary across countries over the full sample, and show different statistical significances, signs and magnitudes across countries in the full sample. Figure 2 provides a better picture of this effect by showing at the 95% confidence intervals, the

developments of the marginal impact of exchange rate pressure on poverty for varying levels of fiscal redistribution. The statistically significant marginal impacts at the 95% confidence intervals are those including only the upper and lower bounds of the confidence interval that are either above or below the zero line. The Figure confirms the previous findings, as it shows that the marginal effect of exchange rate pressure on poverty could be positive and negative, but decreases as the extent (or size) of fiscal redistribution increases. However, it is not always statistically significant and is statistically significant for values of the index of fiscal redistribution higher than 11.74 (this number is obtained from the software Stata when plotting the graph displayed in Fig. 2). Thus, for levels of fiscal redistribution higher than 11.7, exchange rate pressure exerts no significant effect on poverty. In contrast, for levels of fiscal redistribution lower than (or equal to) 11.7, exchange rate pressure leads to higher poverty headcount rates, and the magnitude of this positive effect increases as the extent of fiscal redistribution declines (i.e. as governments redistribute less).

The take-home message from the analysis in Table 3 is that a sizeable fiscal redistribution (including through taxes and spending) helps cancel out the effect of external shocks on poverty in developing countries.

Results concerning control variables in Table 3 are consistent with those in Table 2.

## 6 Further analysis

The analysis undertaken in the present section aims to partially check the robustness of previous findings in Tables 2 and 3 by replacing in model (1), the variable “ERP” with a measure of terms-of-trade instability, which is also a shock variable. In fact, terms-of-trade instability captures much more shocks to the current account (and particularly exports and imports) than shocks to capital flows. Therefore, the analysis under this section represents a partial check of robustness of findings obtained in Tables 2 and 3.

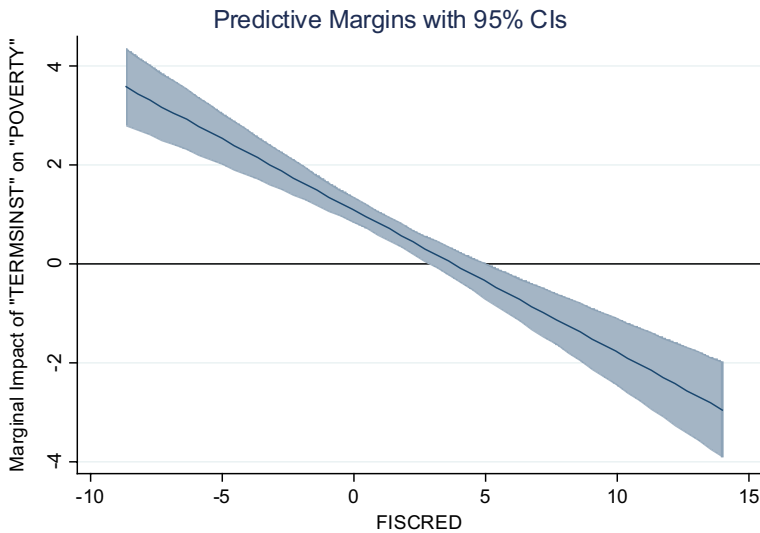
The results of this analysis are reported in Table 4. The terms-of-trade instability variable denoted “TERMSINST” has been computed as the standard deviation of the annual growth of terms of trade over non-overlapping sub-periods of 5 year. Terms of trade represent here the ratio of the export price index to import price index.

We carry out several estimations (i.e. with the “TERMSINST” variable) in undertaking the robustness check analysis. We estimate the model only with the “TERMSINST” variable (see results in column [1] of Table 4), with the variable “TERMSINST” and its squared term (see results in column [2] of Table 4), with the interaction between “TERMSINST” and the “LDC” dummy (see results in column [3] of Table 4) and finally with the interaction between “TERMSINST” and the variable “FISCRED” (see results in column [4] of Table 4). All these estimations are performed using the two-step system GMM estimator. The results of the diagnostic tests (see the bottom of Table 4) that help in assessing the appropriateness of this estimator are fully satisfactory. We obtain in column [1] that over the full sample, greater instability of terms of trade is positively and significantly (at the 1% level) associated with poverty: a one-point increase in the terms-of-trade instability index

**Table 4** Impact of terms-of-trade instability on poverty

Variables	Poverty (1)	Poverty (2)	Poverty (3)	Poverty (4)
<i>Estimator: Two-step system GMM</i>				
POVERTY <sub>t-1</sub>	0.737*** (0.0165)	0.716*** (0.0162)	0.689*** (0.0187)	0.712*** (0.0149)
Log(TERMSINST)	0.510*** (0.151)	4.154*** (0.408)	-0.310* (0.182)	1.078*** (0.137)
[Log(TERMSINST)] <sup>2</sup>		0.895*** (0.105)		
FISCRED	0.473*** (0.0549)	0.463*** (0.0574)	0.311*** (0.0878)	-0.101 (0.156)
[Log(TERMSINST)]*LDC			3.622*** (0.306)	
[Log(TERMSINST)]* FISCRED				-0.288*** (0.0380)
LDC			16.36*** (1.514)	
Log(GDPC)	-1.666*** (0.605)	-2.278*** (0.544)	-1.110** (0.560)	-2.697*** (0.616)
Log(OPEN)	-1.086*** (0.286)	-0.961*** (0.275)	-0.709* (0.363)	-0.881*** (0.272)
FD	-0.0138*** (0.00374)	-0.0146*** (0.00356)	-0.0188*** (0.00587)	-0.0195*** (0.00336)
FO	0.0265*** (0.00868)	0.0338*** (0.00929)	0.0404*** (0.00833)	0.0289*** (0.00648)
POLITY2	-0.332*** (0.0400)	-0.349*** (0.0504)	-0.331*** (0.0527)	-0.289*** (0.0287)
EDU	-0.0161* (0.00858)	-0.0180* (0.00978)	0.0152* (0.00874)	-0.0185** (0.00843)
INFL	0.897*** (0.122)	1.022*** (0.120)	1.216*** (0.156)	0.901*** (0.120)
TREND	-0.523*** (0.0617)	-0.550*** (0.0610)	-1.268*** (0.160)	-0.553*** (0.0672)
Constant	12.06* (6.514)	21.49*** (5.675)	5.507 (7.503)	23.96*** (6.215)
Observations-countries	320–87	320–87	320–87	320–87
Number of instruments	79	80	80	80
AR1 ( <i>p</i> value)	0.0024	0.0032	0.0022	0.0057
AR2 ( <i>p</i> value)	0.1973	0.2207	0.1885	0.1949
AR3 ( <i>p</i> value)	0.3032	0.3621	0.3767	0.2402
Sargan ( <i>p</i> value)	0.3172	0.2680	0.4164	0.3257

\**p* value < 0.1; \*\**p* value < 0.05; \*\*\**p* value < 0.01. Robust Standard Errors are in parenthesis. In the two-step system GMM estimations, the variables “FD”, “FISCRED”, “FINOPN”, “OPEN”, “EDU” and “POLITY” have been considered as endogenous. The other variables have been considered as exogenous



**Fig. 3** Marginal Impact of “TERMSINST” on “POVERTY” for varying levels of fiscal redistribution. *Source:* Author

induces a 0.5-point rise in the poverty headcount index. In the meantime, results in column [2] show that the coefficients of both “TERMSINST” and its squared term are positive and statistically significant at the 1% level. This confirms the finding in column [2] of Table 2, and suggests here that the positive poverty effect of terms-of-trade instability is amplified by additional shocks that lead to greater terms-of-trade instability. The outcomes reported in column [3] of Table 4 show that terms-of-trade instability exerts a higher positive effect on poverty in LDCs than in NonLDCs (the coefficient of the interaction variable (“[Log(TERMSINST)]\*LDC”) is positive and significant at the 1% level). Hence, the net effects of terms-of-trade instability on poverty in LDCs and NonLDCs amount, respectively, to 3.9 [=0.311+3.622] and 0.3. A 1-point increase in the index of terms-of-trade instability leads to 3.9 points increase in the poverty headcount index in LDCs and a 0.3-point increase in the poverty headcount index in NonLDCs. Incidentally, fiscal redistribution exerts a positive effect on poverty in column [3], which is consistent with previous findings.

Turning now to column [4] of Table 4, we obtain that the coefficients of “TERMSINST” are positive and statistically significant at the 1% level, while the interaction term of the variable (“[Log(TERMSINST)]\*FISCRED”) is negative and statistically significant at the 1% level. The combination of these two results shows that as the extent of fiscal redistribution rises, the magnitude of the positive effect of terms-of-trade instability on poverty diminishes, and there is a turning point of the index of fiscal redistribution above which the effect of terms-of-trade instability on poverty headcount becomes negative. This threshold (turning point) amounts to 3.74 (= 1.078/0.288) and falls within the range of values of the index of fiscal redistribution. Thus, on average over the full sample, countries with a level of fiscal redistribution lower than 3.74 experience a positive effect of terms-of-trade instability

on poverty, but the magnitude of this positive effect diminishes as the extent of fiscal redistribution increases. For countries with a level of fiscal redistribution higher than 3.74, terms-of-trade instability leads to lower poverty rates, and the higher the extent of fiscal redistribution, the greater is the magnitude of the negative (reducing) effect of terms-of-trade instability on the poverty headcount ratio. To better capture this effect, we present in Fig. 3, at the 95% confidence intervals, the developments of the marginal impact of terms-of-trade instability on poverty for varying levels of fiscal redistribution. The Figure confirms the previous finding that fiscal redistribution helps to mitigate the positive effect of shocks (in particular here, terms-of-trade shocks that result in terms-of-trade instability) on poverty. Specifically, the marginal effect of terms-of-trade instability on poverty decreases as the extent of fiscal redistribution increases. In addition, it takes positive and negative values, but is not always statistically significant. It is not statistically significant for values of the index of fiscal redistribution ranging between 3.14 and 4.95. Thus, for levels of fiscal redistribution ranging between 3.14 and 4.95, terms-of-trade instability exerts no significant effect on poverty. In contrast, higher terms-of-trade instability generates higher poverty headcount rates for levels of fiscal redistribution lower than 3.14. This signifies that in countries whose level of fiscal redistribution is lower than 6.26, terms-of-trade instability exerts a positive and significant effect on poverty, and the lower the level of fiscal redistribution, the greater is the magnitude of the positive effect of terms-of-trade instability on poverty. On the other hand, countries whose levels of fiscal redistribution are higher than 4.95 experience a negative effect of terms-of-trade instability on poverty. For this set of countries, the higher the level of fiscal redistribution, the greater is the magnitude of the negative (reducing) effect of terms-of-trade instability on poverty. Results concerning control variables in Table 4 are consistent with those in Table 2.

## 7 Conclusion

This article examines the effect of exchange rate pressure—used as a proxy for export demand and foreign financial flows shocks—and fiscal redistribution on poverty in developing countries. It further considers the extent to which exchange rate pressure and fiscal redistribution interact in affecting poverty in developing countries. The analysis shows for the full sample that exchange rate pressure exerts a positive effect on poverty, and the magnitude of this positive effect is the same for LDCs and NonLDCs. Furthermore, fiscal redistribution exerts yet a positive effect on poverty in developing countries, but it reduces poverty in LDCs, while increasing it in NonLDCs. Interestingly, over the full sample, exchange rate pressure induces higher poverty, while fiscal redistribution helps in reducing the magnitude of this positive effect of exchange rate pressure on poverty. These findings are, to a large extent, confirmed when we use terms-of-trade instability as the measure of size of shocks (in replacement of the exchange rate pressure variable). The main exceptions (in terms of findings) here are that while terms-of-trade instability is positively associated with poverty over the full sample, it exerts a higher positive effect on poverty

in LDCs than in NonLDCs. Additionally, the positive effect of terms-of-trade instability on poverty decreases as the extent of fiscal redistribution increases, but it appears that above a certain level of the extent of fiscal redistribution, terms-of-trade instability results in lower poverty rate: the magnitude of this negative (reducing) effect rises with the rise in the extent of fiscal redistribution. In terms of policy implications, these findings suggest that well-designed fiscal redistributive measures could help governments mitigate the adverse effects of external economic and financial shocks on poverty in developing countries, which are subject to frequent external shocks. However, it could be difficult in the present analysis to lay out the nature of fiscal redistribution (in terms of spending or taxes) that could help mitigate or cancel out the adverse effects of external shocks on poverty in developing countries, because the nature of such fiscal redistribution should be country-specific. In this regard, Lustig (2017: p. 33) has emphasized that one fundamental prescription concerning fiscal redistribution policies, including in developing countries, is for governments to design their tax and transfers system so that the after taxes and transfers incomes (or consumption) of the poor should be lower than their incomes (or consumption) before fiscal interventions. An important avenue for future research could be to investigate what type of fiscal redistribution (including through a co-ordinated approach of both taxation and spending) could help developing countries mitigate the effects of external shocks on poverty. The framework of analysis laid out by IMF (2014) could be useful in this regard.

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## Compliance with ethical standards

**Conflict of interest** The authors declare that there is no conflict of interest.

**Human and animal rights and informed consent** The research does not involve any human participants or animals. Furthermore, the paper has received no financial support, and does not require any “Informed Consent”.

## Appendix

See Tables 5, 6 and 7.

**Table 5** Definition and source of variables

Variables	Definition	Sources
POVERTY	Poverty headcount ratio at \$1.90 a day is the percentage of the population living on less than \$1.90 a day at 2011 international prices	Data on this indicator are collected from the World Development Indicators (WDI) of the World Bank and POVCALNET of the World Bank (see <a href="https://research.worldbank.org/PoocalNet/pov/OnDemand.aspx">https://research.worldbank.org/PoocalNet/pov/OnDemand.aspx</a> ). Missing data have been completed using linear interpolation technique over two to four TRENDS (see also Santos-Paulino 2017 who has adopted the same procedure, although, she has not mentioned it explicitly in her article)
ERP	The variable “ERP” represents the transformed measure of the exchange rate pressure. This transformation has been made using the technique proposed by Yeyati et al. (2007) (see also Morrissey et al. 2016) $ERP = \text{sign}(PI) * \log(1 +  PI )$ (2) where $ PI $ refers to the absolute value of the exchange rate pressure, denoted “PI”, and where $PI_{it} = w_{E,i} E_{i,t-1} - w_{RES,i} RES_{i,t-1}$ . $E$ is the exchange rate in local currency units per USD; $RES$ is the size of reserves, $w_{E,i}$ and $w_{RES,i}$ are country-specific weights: $w_{E,i} = \frac{\sigma_{RES,i}}{\sigma_{RES,i} + \sigma_{E,i}}$ and $w_{RES,i} = \frac{\sigma_{E,i}}{\sigma_{RES,i} + \sigma_{E,i}}$ . $\sigma_{RES,i}$ stands for the standard deviation of $\frac{\Delta RES_{i,t}}{RES_{i,t-1}}$ over the full period of the analysis (here, 1980–2014). Similarly, $\sigma_{E,i}$ is the standard deviation of $\frac{\Delta E_{i,t}}{E_{i,t-1}}$ over the full period of the analysis (here, 1980–2014). The variable “PI” has been computed using the annual data over the period 1980–2014	Author’s calculation based on data from the WDI
FISCRED	This is the measure of the size of fiscal redistribution. It is the difference between the market Gini (Gini of incomes before taxes and transfers) and net Gini of incomes (Gini of incomes after taxes and transfers). The Gini indices range between 0 and 100, with higher values reflecting a more unequal income distribution	Author’s calculation based on data on Gini of incomes retrieved from the Standardized World Income Inequality Database (SWIID)—SWIID Version 8.0, February 2019 (see Solt 2019). See online at: <a href="https://isolt.org/swiid/">https://isolt.org/swiid/</a>
TERMSINST	This is the measure of terms-of-trade instability. Terms of trade represent the ratio of the export price index to import price index. Terms-of-trade volatility has been calculated as the standard deviation of annual terms-of-trade growth over 5-year non-overlapping sub-periods	Authors’ calculation based on terms-of-trade data extracted from the WDI
GDPC	GDP per capita (constant 2010 US\$)	WDI



Table 5 (continued)

Variables	Definition	Sources
FD	This is the indicator of financial. It is a composite index of four indicators of financial development, which are the liquid liabilities (% GDP); the private credit by deposit money banks and other financial institutions (% GDP); the bank deposits (% GDP); and the financial system deposit (% GDP). The “FD” indicator has been computed by relying on the factor analysis approach, including the principal component analysis that allows to extract a common factor from the above-mentioned four indicators of financial development (see, for example, Ang and McKibbin 2007; Huang 2010; and David et al. 2014). Higher values of “FD” reflect higher depth of financial development, and lower values indicate lower level of financial development	Author’s calculation based on data on the four indicators from the World Bank’s Financial Structure dataset developed by Beck et al. (2000; 2009) and Čihák et al. (2012) and updated in June 2017
FO	This is the measure of de jure financial openness	This index has been computed by Chinn and Ito (2006) and updated in July 2019. Its value ranges between 0 and 1. We have multiplied this index by 100 so as to ensure a coherence with the trade policy variable defined below (which is also a measure of a de jure trade policy, whose value ranges between 0 and 100) See: <a href="https://web.pdx.edu/~ito/Chinn-Ito_webseite.htm">https://web.pdx.edu/~ito/Chinn-Ito_webseite.htm</a>
OPEN	This is the measure of trade openness suggested by Squalli and Wilson (2011). It is calculated as the measure of trade openness (the variable “OPEN” previously described) adjusted by the proportion of a country’s trade level relative to the average world trade (see Squalli and Wilson 2011: p. 1758)	Authors’ calculation based on data extracted from the WDI
EDU	This is the average of the gross primary school enrollment (%), gross secondary school enrollment (%), and gross tertiary school enrollment (%)	Author’s calculation based on data collected from the WDI

Table 5 (continued)

Variables	Definition	Sources
POLITY2	This is an index extracted from Polity IV Database (Marshall and Jaggers 2009). It represents the degree of democracy based on competitiveness of political participation, the openness and competitiveness of executive recruitment and constraints on the chief executive. Its values range between -10 and +10, with lower values reflecting autocratic regimes, and greater values indicating democratic regimes. Specifically, the value +10 for this index represents a strong democratic regime, while the value -10 stands for strong autocratic regime	Polity IV Database (Marshall and Jaggers 2009)
INFL	The variable "INFL" has been calculated using the following formula (see Yeyati et al. 2007): $INFL = \text{sign}(INFLATION) * \log(1 +  INFLATION )$ , where $ INFLATION $ refers to the absolute value of the annual inflation rate (%), denoted "INFLATION" The annual inflation rate (%) is based on consumer price index—CPI—(annual %) where missing values has been replaced with values of the GDP Deflator (annual %)	Authors' calculation based on data from the WDI

**Table 6** Standard descriptive statistics on the variables

Variable	Observations	Mean	SD	Minimum	Maximum
POVERTY	585	28.591	25.999	0.002	94.402
PI	542	-0.267	0.840	-12.166	0.342
ERP	542	-0.175	0.285	-2.578	0.294
TERMSINST	547	0.211	0.288	0.006	4.120
FISCREDD	480	2.126	3.620	-8.620	14.000
FO	544	34.996	30.898	0	100
INFLATION	568	71.654	400.802	-1.328	6424.987
GDPC	566	2717.567	2610.277	151.102	14,018.550
FD	542	58.007	39.817	0.000	235.148
OPEN	546	0.001	0.003	0.000	0.038
EDU	479	169.042	54.724	38.300	296.397
POLITY2	574	1.139	6.226	-10.000	10.000

**Table 7** List of countries in the full sample

Full sample	LDCs		
Albania	Fiji	Nepal	Angola
Algeria	Gambia, The	Nicaragua	Bangladesh
Angola	Georgia	Nigeria	Bhutan
Argentina	Ghana	Pakistan	Burundi
Armenia	Guatemala	Panama	Cambodia
Azerbaijan	Guinea	Papua New Guinea	Central African Republic
Bangladesh	Guyana	Paraguay	Chad
Belarus	Honduras	Peru	Comoros
Bhutan	India	Philippines	Congo, Dem. Rep
Botswana	Indonesia	Romania	Djibouti
Brazil	Jamaica	Russian Federation	Gambia, The
Bulgaria	Jordan	Rwanda	Guinea
Burundi	Kazakhstan	Sierra Leone	Lao PDR
Cambodia	Kenya	South Africa	Lesotho
Cameroon	Kyrgyz Republic	Sri Lanka	Liberia
Cape Verde	Lao PDR	Sudan	Malawi
Central African Republic	Lesotho	Suriname	Mauritania
Chad	Liberia	Swaziland	Mozambique
China	Macedonia, FYR	Tajikistan	Nepal
Colombia	Malawi	Tanzania	Rwanda
Comoros	Malaysia	Thailand	Sierra Leone
Congo, Dem. Rep	Mauritania	Tunisia	Sudan
Congo, Rep	Mauritius	Turkey	Tanzania
Costa Rica	Mexico	Uganda	Uganda
Djibouti	Moldova	Ukraine	Yemen, Rep

**Table 7** (continued)

Full sample	LDCs		
Dominican Republic	Mongolia	Venezuela, RB	Zambia
Ecuador	Morocco	Vietnam	
Egypt, Arab Rep	Mozambique	Yemen, Rep	
El Salvador	Namibia	Zambia	

## References

- Acemoglu D, Johnson S, Robinson JA, Thaicharoen Y (2003) Institutional causes, macroeconomics symptoms: volatility, crises, and growth. *J Monet Econ* 50(1):49–122
- Ahmed S (2003) Sources of macroeconomic fluctuations in latin america and implications for choice of exchange rate regime. *J Dev Econ* 72:181–202
- Ahrend R, Arnold J, Moeser C (2011) The sharing of macroeconomic risk: who loses (and gains) from Macroeconomic shocks. OECD Economics department working paper no. 877-ECO/WKP(2011)46, Organisation for Economic Co-operation and Development, Paris
- Aizenman J, Hutchison MM (2012) Exchange market pressure and absorption by international reserves: emerging markets and fear of reserve loss during the 2008–2009 crisis. *J Int Money Finance* 31:1076–1091
- Akhter S, Daly K (2009) Finance and poverty: evidence from fixed effect vector decomposition. *Emerg Mark Rev* 10:191–206
- Alexander D (2010) The impact of the economic crisis on the world's poorest countries. *Glob Policy* 1(1):118–120
- Alimi N, Aflouk N (2017) Terms-of-trade shocks and macroeconomic volatility in developing countries: panel smooth transition regression models. *J Int Trade Econ Dev* 26(3):534–551
- Álvarez R, García-Marín A, Ilabaca S (2018) Commodity price shocks and poverty reduction in Chile. *Resour Policy*. <https://doi.org/10.1016/j.resourpol.2018.04.004>
- Anderson E, Jalles d'Orey MA, Duvendack M, Esposito L (2018) Does government spending affect income poverty? A meta-regression analysis. *World Dev* 103:60–71
- Ang JB, McKibbin WJ (2007) Financial liberalization, financial sector development and growth: evidence from Malaysia. *J Dev Econ* 84(1):215–233
- Bacchetta M, Jansen M, Lennon C, Piermartini R (2009) Exposure to external shocks and the geographical diversification of exports. In: Newfarmer R, Shaw W, Walkenhorst P (eds) *Breaking into new markets: emerging lessons for export diversification*. World Bank, Washington, DC
- Baldacci C, de Mello L, Inchauste G (2002) Financial crisis, poverty and income distribution. IMF working paper, 02/04. IMF, Washington DC
- Barrot LD, Calderón C, Servén L (2018) Openness, specialization, and the external vulnerability of developing countries. *J Dev Econ* 134:310–328
- Beck T, Demirgüç-Kunt A, Levine R (2000) A new database on financial development and structure. *World Bank Econ Rev* 14(3):597–605
- Beck T, Demirgüç-Kunt A, Levine R (2007) Finance, inequality, and poverty: cross-country evidence. *J Econ Growth* 12:21–47
- Beck T, Demirgüç-Kunt A, Levine R (2009) Financial institutions and markets across countries and over time: data and analysis. World Bank policy research working paper 4943, Washington, DC
- Berg A, Pattillo C (1999) Predicting currency crises: the indicators approach and an alternative. *J Int Money Finance* 18(4):561–586
- Berg A, Ostry JD, Tsangarides CG, Yakhshilikhov Y (2018) Redistribution, inequality, and growth: new evidence. *J Econ Growth* 23(3):259–305
- Bergh A, Nilsson T (2014) Is globalization reducing absolute poverty? *World Dev* 62:42–61
- Blundell R, Bond S (1998) Initial conditions and moment restrictions in dynamic panel data models. *J Econom* 87(1):115–143
- Bredenkamp H, Bersch J (2012) Commodity price volatility: impact and policy challenges for low income countries. In: Arezki R, Pattillo C, Quintyn M, Zhu M (eds) *Commodity price volatility*

- and inclusive growth in low income countries. International Monetary Fund, Washington, DC, pp 55–67
- Broda C (2004) Terms of trade and exchange rate regimes in developing countries. *J Int Econ* 63(1):31–58
- Burgess R, Pande R (2005) Do rural banks matter? Evidence from the Indian social banking experiment. *Am Econ Rev* 95:780–795
- Cariolle J, Goujon M, Guillaume P (2016) Has structural economic vulnerability decreased in least developed countries? Lessons drawn from retrospective indices. *J Dev Stud* 52(5):591–606
- Arestis P, Caner A (2010) Capital account liberalisation and poverty: how close is the link? *Camb J Econ* 34(2):295–323 (**Special focus: globalisation, institutional transformation and equity**)
- Chen S, Ravallion M (2009) The impact of the global financial crisis on the world's poorest. World Bank Development Research Group, Vox-EU
- Chinn MD, Ito H (2006) What matters for financial development? Capital controls, institutions, and interactions. *J Dev Econ* 81(1):163–192
- Čihák M, Demirgüç-Kunt A, Feyen E, Levine R (2012) Benchmarking financial development around the world. Policy research working paper 6175, World Bank, Washington, DC
- Claudio R (2004) How can tax policies and macroeconomic shocks affect the poor? A quantitative assessment using a computable general equilibrium framework for Colombia. CEPAL, Santiago-Chile
- Cranfield J, Preckel P, Hertel T (2007) Poverty analysis using an international cross-country demand system. Policy research working paper 4285, World Bank, Washington, DC
- Dabla-Norris E, Gündüz YB (2014) Exogenous shocks and growth crises in low-income countries: a vulnerability index. *World Dev* 59:360–378
- Dabla-Norris E, Minoiu C, Zanna L-F (2015) Business cycle fluctuations, large macroeconomic shocks, and development aid. *World Dev* 69:44–61
- David AC, Mlachila M, Moheeput A (2014) Does openness matter for financial development in Africa? IMF working paper WP/14/94. International Monetary Fund, Washington, DC
- Decaluwe B, Patry A, Savard L (1998) Income distribution, poverty measures and trade shocks: a computable general equilibrium model of an archetype developing country. *Cahier de recherche*, no. 98-14, University of Laval, December, CREFA
- Dollar D, Kraay A (2004) Trade, growth and poverty. *Econ J* 114(493):F22–F49
- Dollar D, Kraay A (2002) Growth is good for the poor. *J Econ Growth* 7:195–225
- Driscoll JC, Kraay AC (1998) Consistent covariance matrix estimation with spatially dependent panel data. *Rev Econ Stat* 80(4):549–560
- Easterly W, Kremer M, Pritchett L, Summers L (1993) Good policy or good luck? Country growth performance and temporary shocks. *J Monet Econ* 32(3):459–483
- Essama-Nssah B (2005) Simulating the poverty impact of macroeconomic shocks and policies. World Bank policy research working paper 3788 (WPS3788), World Bank, Washington, DC
- Essers D (2013) Developing country vulnerability in light of the global financial crisis: shock therapy? *Rev Dev Finance* 3(2):61–83
- Estrades C, Terra MI (2012) Commodity prices, trade, and poverty in Uruguay. *Food Policy* 37(1):58–66
- Fosu AK (2018) The recent growth resurgence in africa and poverty reduction: the context and evidence. *J Afr Econ* 27(1):92–107
- Gerry C, Mickiewicz T, Nikoloski Z (2014) Mortality and financial crises. *J Int Dev* 26:939–948
- Girton L, Roper D (1977) A monetary model of exchange market pressure applied to the postwar canadian experience. *Am Econ Rev* 67:537–548
- Gnangnon SK (2019) Does multilateral trade liberalization help reduce poverty in developing countries? *Oxf Dev Stud* 47(4):435–451
- Gozgor G, Ranjan P (2017) Globalisation, inequality and redistribution: theory and evidence. *World Econ* 40(12):2704–2751
- Grundler K, Kollner S (2017) Determinants of governmental redistribution: Income distribution, development levels, and the role of perceptions. *J Comp Econ* 45(4):930–962
- Guillaumont P (2009) An economic vulnerability index: its design and use for international development policy. *Oxf Dev Stud* 37(3):193–228
- Guillaumont-Jeanneney S, Kpodar K (2011) Financial development and poverty reduction: can there be a benefit without a cost? *J Dev Stud* 47(1):143–163
- Guillaumont P, Puech F (2005) L'instabilité macroéconomique comme facteur de criminalité. Working papers 200519, CERDI, Clermont-Ferrand
- Habib B, Narayan A, Olivieri S, Sanchez C (2010) The impact of the financial crisis on poverty and income distribution: insights from simulations in selected countries. *World Bank Econ Prem* 7:1–4

- Harberger AC (1950) Currency depreciation, income, and the balance of trade. *J Polit Econ* 58(1):47–60
- Hertel T, Ivanic M, Preckel P, Cranfield J (2004) The earnings effects of multilateral trade liberalization: implications for poverty. *World Bank Econ Rev* 18(2):205–236
- Higgins S, Lustiga N (2016) Can a poverty-reducing and progressive tax and transfer system hurt the poor? *J Dev Econ* 122:63–75
- Hnatkowska V, Loayza N (2005) Volatility and growth. In: Aizenmann J, Pinto B (eds) *Managing economic volatility and crises*. Cambridge University Press, Cambridge, pp 65–100
- Huang Y (2010) Political institutions and financial development: an empirical study. *World Dev* 38(2):1667–1677
- IMF (2008) Food and fuel prices: recent developments, macroeconomic impact, and policy responses international monetary fund, Washington, DC. <https://www.imf.org/en/Publications/Policy-Papers/Issues/2016/12/31/Food-and-Fuel-Prices-Recent-Developments-Macroeconomic-Impact-and-Policy-Responses-An-Update-PP4280>
- IMF (2011) Managing volatility: a vulnerability exercise for low-income countries. [www.imf.org/external/np/pp/eng/2011/030911.pdf](http://www.imf.org/external/np/pp/eng/2011/030911.pdf)
- IMF (2014) Fiscal policy and income inequality. IMF policy paper. <https://www.imf.org/external/np/pp/eng/2014/012314.pdf>
- IMF (2017) IMF fiscal monitor: tackling inequality, October 2017. <https://www.imf.org/en/Publications/FM/Issues/2017/10/05/fiscal-monitor-october-2017>
- Ivanic M, Martin V (2008) Implications of higher global food prices for poverty in low-income countries. *Agric Econ* 39(1):405–416
- Iversen T, Soskice D (2006) Electoral institutions and the politics of coalitions: why some democracies redistribute more than others. *Am Polit Sci Rev* 100(2):165–181
- Jacquet P, Atlani A, Lisser M (2017) Policy responses to terms of trade shocks. FERDI working paper 205. FERDI, Clermont-Ferrand
- Jouini N, Lustig N, Moumimi A, Shimeles A (2018) Fiscal policy, income redistribution, and poverty reduction: evidence from Tunisia. *Rev Income Wealth* 64(S1):S225–S248
- Kaminsky G, Lizondo S, Reinhart C (1998) Leading indicators of currency crisis. IMF staff papers, 45, 1–14. International Monetary Fund, Washington, DC
- Kammasa P, Sarantides V (2019) Do dictatorships redistribute more? *J Comp Econ* 47(1):176–195
- Kiendrebeogo Y, Minea A (2016) Financial development and poverty: evidence from the CFA Franc Zone. *Appl Econ* 48(56):5421–5436
- Kohler P (2015) Redistributive policies for sustainable development: looking at the role of assets and equity. DESA working paper no. 139-ST/ESA/2015/DWP/139, United Nations Department of Economic & Social Affairs, New York
- Kose MA (2002) Explaining business cycles in small open economies: how much do world prices matter? *J Int Econ* 56(2):299–327
- Kose MA, Riezman R (2001) Trade shocks and macroeconomic fluctuations in Africa. *J Dev Econ* 65(1):55–80
- Kpodar K, Singh R (2011) Does financial structure matter for poverty? Evidence from developing countries. World Bank policy research working paper, WPS5915, Washington, DC
- Lacalle-Calderon M, Perez-Trujillo M, Neira I (2018) Does microfinance reduce poverty among the poorest? A macro quantile regression approach. *Dev Econ* 56(1):51–65
- Laursen S, Metzler LA (1950) Flexible exchange rates and the theory of employment. *Rev Econ Stat* 32(4):281–299
- Le Goff M, Singh RJ (2014) Does trade reduce poverty? A view from Africa. *J Afr Trade* 1(1):5–14
- Loayza N, Raddatz C (2007) The structural determinants of external vulnerability. *World Bank Econ Rev* 21(3):359–387
- Luebker M (2012) Income inequality, redistribution, and poverty: contrasting rational choice and behavioural perspectives. ILO research paper no. 1, International Labour Office, Geneva
- Lustig N (2017) Fiscal policy, inequality and the poor in the developing world. UNU-WIDER working paper 164, United Nations University-World Institute for Development Economics Research, Helsinki
- Lustig N (2018) Fiscal policy, income redistribution, and poverty reduction in low-and middle-income countries. Centre for Global Development, Working paper 448, Washington, DC
- Mahadevan R, Nugroho A, Hidayat A (2017) Do inward looking trade policies affect poverty and income inequality? Evidence from Indonesia's recent wave of rising protectionism. *Econ Model* 62:23–34

- Marshall MG, Jagers K (2009) Polity IV project country reports. CIDUM, University of Maryland, College Park
- McCulloch N, Winters LA, Cirera X (2001) Trade liberalization and poverty: a handbook. Centre for Economic Policy Research, London
- Mendoza EG (1995) The terms of trade, the real exchange rate and economic fluctuations. *Int Econ Rev* 36:101–137
- Mendoza RU (2009) Aggregate shocks, poor households and children—transmission channels and policy responses. *Glob Soc Policy* 9(1):55–78
- Milanovic B (2000) The median-voter hypothesis, income inequality and income redistribution: An empirical test with the required data. *Eur J Polit Econ* 16(3):367–410
- Moncarz P, Barone S, Descalzi R (2018) Shocks to the international prices of agricultural commodities and the effects on welfare and poverty. A simulation of the ex-ante long-run effects for Uruguay. *Int Econ* 156:136–155
- Morrissey O, Von Haldenwang C, Von Schiller A, Ivanyna M, Bordon I (2016) Tax revenue performance and vulnerability in developing countries. *J Dev Stud* 52(12):1689–1703
- Nicita A, Olarreaga M, Silva P (2018) Cooperation in WTO's tariff waters? *J Polit Econ* 126(3):1302–1338
- Nickell S (1981) Biases in dynamic models with fixed effects. *Econometrica* 49(6):1417–1426
- Nkurunziza JD, Tsouou K, Cazzaniga S (2017) Commodity dependence and human development. *Afr Dev Rev* 29(S1):27–41
- Patnaik I, Felman F, Shah A (2017) An exchange market pressure measure for cross country analysis. *J Int Money Finance* 73:62–77
- Raddatz C (2007) Are external shocks responsible for the instability of output in low income-countries? *J Dev Econ* 84(1):155–187
- Ramey G, Ramey V (1995) Cross country evidence on the link between volatility and growth. *Am Econ Rev* 85(5):1138–1151
- Ravallion M (2009) Bailing out the world's poorest. *Challenge* 52(2):55–80
- Rewilak J (2017) The role of financial development in poverty reduction. *Rev Dev Finance* 7:169–176
- Rewilak J (2018) The impact of financial crises on the poor. *J Int Dev* 30(1):3–19
- Robilliard AS, Bourguignon F, Robinson S (2002) Crisis and income distribution: a micro-macro model for Indonesia. Mimeo, World Bank, Washington, DC
- Rodrik D (1998) Why do more open economies have bigger governments? *J Polit Econ* 106(5):997–1032
- Roodman DM (2009) A note on the theme of too many instruments. *Oxford Bull Econ Stat* 71(1):135–158
- Sachs J, Tornell A, Velasco A (1996) Financial crises in emerging markets: the lessons from 1995. *Brookings papers on economic activity*, 1996, no. 1. Brookings Institution, Washington, DC
- Saijo H (2020) Redistribution and fiscal uncertainty shocks. *Int Econ Rev*. <https://doi.org/10.1111/iere.12449>
- Santos-Paulino AU (2017) Estimating the impact of trade specialization and trade policy on poverty in developing countries. *J Int Trade Econ Dev* 26(6):693–711
- Schmitt-Grohé S, Uribe M (2018) How important are terms-of-trade shocks? *Int Econ Rev* 59(1):1–27
- Sennoga EB, Matovu JM (2016) Growth and welfare effects of macroeconomic shocks in Uganda. Occasional paper no. 39, Economic Policy Research Centre (EPRC), Uganda
- Singh RJ, Huang Y (2015) Financial deepening, property rights, and poverty: evidence from Sub-Saharan Africa. *J Bank Financ Econ* 1(3):130–151
- Solt F (2019) Measuring income inequality across countries and over time: the standardized world income inequality database. SWIID Version 8.0, February 2019
- Squalli J, Wilson K (2011) A new measure of trade openness. *World Econ* 34(10):1745–1770
- Yeyati EL, Panizza U, Stein E (2007) The cyclical nature of North-South FDI flows. *J Int Money Finance* 26:104–130