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Aid, Microfinance and Income Inequality: a Global View

Ayuda al desarrollo, microfinanzas y desigualdad en los ingresos: una visión global

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Abstract

This article studies the relationship between foreign aid and microfinance flows and income inequality. Using a broad theoretical framework on inequality, and panel data from 87 countries from 1995 to 2012, we study the dynamics of aid and microfinance and how these relate to income inequality. Our results highlight important differences across world regions and the need to consider specificities of the context when assessing the impact of both aid and microfinance on inequality. In this line, we provide an analysis for three different countries: Bolivia, Bangladesh, and Indonesia.

Key Words: microfinance; foreign aid, income inequality; panel data.

Resumen

Este artículo estudia la relación entre los flujos de Ayuda Oficial al Desarrollo (AOD) y de microfinanzas y la desigualdad de ingresos. Utilizando un amplio marco teórico sobre la desigualdad y datos de 87 países desde 1995 hasta 2012, mediante la metodología de los datos de panel estudiamos la relación entre la AOD y las microfinanzas y la desigualdad de ingresos. Nuestros resultados muestran diferencias importantes entre regiones, y la necesidad de considerar las características específicas de cada contexto al evaluar el impacto de la ayuda y de las microfinanzas en la desigualdad. En esta línea, se realiza también un análisis detallado de tres países: Bolivia, Bangladesh e Indonesia.

Palabras clave: microfinanzas; Ayuda Oficial al Desarrollo; desigualdad de ingresos; panel de datos.

JEL classification : C33; F35; G21; O15.

1. Introduction

Inequality has recently emerged as one of the most controversial academic issues, particularly following reports by international institutions such as the UNDP (2013) and IMF (2014) that show how inequalities affect economic and social development. Inequality is important not only for its adverse and deplorable moral consequences, but also because it hampers processes of economic growth and development (Stiglitz, 2012; Ravallion, 2014). Furthermore, inequality matters because it can concentrate political and decision-making power in the hands of elites, leads to suboptimal use of human resources, and exacerbates political and economic instability and the risk of crisis (Dabla-Norris *et al*., 2015). Consequently, reducing income inequality is today at the heart of the international agenda, and the United Nations has proposed a stand-alone goal on inequality: the 10th Sustainable Development Goal (United Nations, 2017).

To fight income inequality, countries can use both internal and external resources. However, developing countries, especially Least Developed Countries (LDCs), have limited domestic resources and weak internal redistribution systems. Likewise, in these countries, some external resources, like foreign direct investment, are expected to be low. Consequently, aid and microfinance flows become especially relevant, and may have the capacity to influence the evolution of inequality in several ways. For instance, microfinance may improve income equality through wider access for the poor to financial services, whereas foreign aid may align financial and fiscal reforms with capacity, through technical assistance services. However, the association between aid, microfinance and income inequality is still understudied.

In this article, we quantitatively analyse the macro-level relationship between foreign aid, microfinance and income inequality, using appropriate panel data for 87 developing countries from 1995 to 2012. We base our empirical analysis in a detailed theoretical discussion of the potential associations between aid and microfinance flows and the evolution of income inequality, and complement it with three specific case studies (Bolivia, Bangladesh and Indonesia).

Foreign aid – in the form of Official Development Assistance (ODA), which has reached a record amount of US$ 170.3 billion in 2016 from all donor countries (OECD, 2017), has been used in poverty and income inequality reduction programs (OECD-DAC, 2008). However, there is still substantial controversy concerning aid´s impact on inequality on receiving countries (Chong, *et al*., 2009;

Herzer & Nunnenkamp, 2012). Microfinance, which emerged and consolidated during the eighties and nineties as a complementary approach to financing development, has also become a major policy tool aimed at promoting social and financial inclusion, job creation, social cohesion and inequality reduction (Balkenhol & Gueïzennec, 2014). However, very little empirical research has been conducted to identify the impact of microfinance on income inequality at the macro-level, probably due to the lack of reliable data on microfinance, which has only recently become available (Bauchet & Morduch, 2010; Imai *et al.*, 2012). To the best of our knowledge, only two articles analyse the inequality reduction effect of microfinance at the macro-level (Hermes, 2014; Kai & Hamori, 2009), but relying on cross-sectional data. None of these papers studies the co-evolution of aid and microfinance as potential factors explaining inequality. This paper tries to fill this gap in the literature.

The rest of the manuscript is organised as follows. Section 2 theoretically discusses the mechanisms for aid and microfinance flows to potentially influence income inequality. Section 3 looks at the data, presenting some descriptive analysis. In Section 4, we estimate an empirical model that allows us to explore the relationship between aid and microfinance and inequality. Section 5 discusses in detail three case studies: for Bolivia, Bangladesh and Indonesia. Finally, Section 6 offers some conclusions.

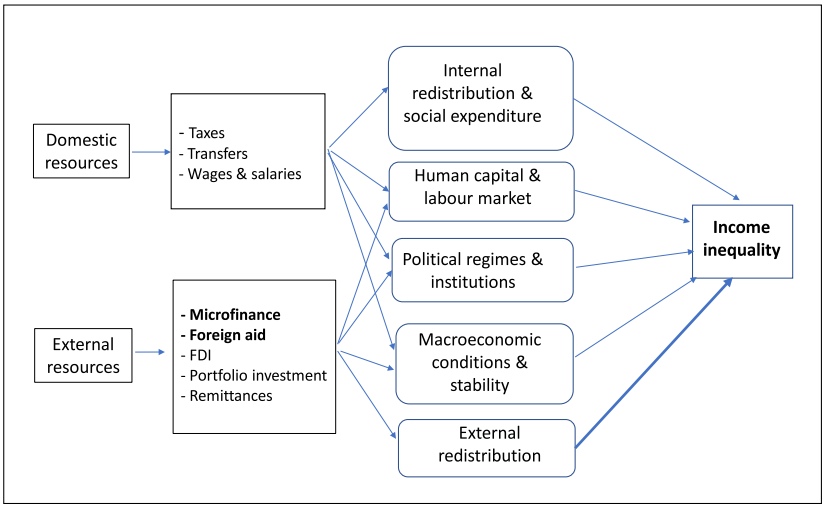
2. Theoretical framework and related literature

To frame our analysis, in Figure 1 we try to show the complex relationship between the allocation of internal and external resources and the evolution of income inequality within countries. Any country seeking for a more egalitarian income distribution has two main sources to achieve this objective: domestic resources (namely internal redistribution) or external resources (where foreign aid and some microfinance flows may be included). Policy markers may use both domestic and external financial flows to influence income inequality through a variety of channels. Following Cornia (2014), we have integrated the main determinants of income inequality in five dimensions or groups of variables: *internal redistribution and social expenditure*, *human capital and labour market*, *political regimes and institutions, macroeconomic conditions and macro-stability*, and *external redistribution*.

Income distribution is determined by wages and salaries in a pre-fiscal phase (or the so-called "market incomes") and by taxes and transfers in a second phase (the so-called "disposable incomes"). Market incomes are strongly influenced by human capital, productivity and returns to education (Lustig, 2011; Rodríguez-Castelán *et al.*, 2016).[1] Also, labour market institutions, by influencing employment levels and wages, determine the evolution of inequality (Calderón & Chong, 2009). Gender gap in earnings is an additional

1 See Manacorda *et al.* (2010) for a wider discussion on returns to education in Latin America.

Fig. 1. Potential channels to fight inequality.



Source: Authors´ elaboration.

variable to be considered (Piketty *et al.*, 2016). Finally, formal and informal employments and salaries can also be significant to explain income inequality in some countries (Amarante, 2016).[2]

Internal redistribution and social expenditure also influence inequality. Internal redistributive and social policies influence transfers and tax collection systems (Alesina & Giuliano, 2010). These policies are influenced by subjective factors, such as beliefs (Benabou & Tirole, 2006), ideology (Alesina *et al.*, 2012), group identity (Costa-Font & Cowell, 2016), or perception of fairness (Durante *et al.*, 2013). Net direct taxes are generally equalising (due to the progressivity effect), whereas indirect taxes (usually regressive) tend to increase inequality (Lustig, 2016).[3]There are some examples of successful progressive redistributive policies: IMF (2014) and World Bank (2016a) for Brazil; or World Bank (2016b) for Chile.[4]

2 Amarante (2016) shows how formal salaries increased income inequality in Argentina, Ecuador, Bolivia, Brazil and Uruguay whereas informal wages reduced it, especially in Bolivia and Ecuador. Self-employment in Ecuador and Argentina and transfers in Argentina and Uruguay, also contribute to inequality reduction during 2002-2011.

3 Lustig (2016) shows a redistributive effect of the indirect taxes in nineteen out of twenty-eight countries. The in-kind transfers (through higher education and health services) were also equalizing. But the author reports that the effect on poverty is not always clear. She detected the so-called "fiscal impoverishment effect", when the transfers are too small to compensate for what the poor pay in taxes. She reports this effect for twelve developing countries. That means that a net fiscal system can be equalizing but poverty-increasing.

4 IMF (2014) and Piketty *et al.* (2017) particularly remark that exempts in personal income taxes and energy subsidies are one of the worse practices for egalitarian policies.

Political regimes and institutions also play a role in income distribution. On the one hand, democracies can show higher inequality levels than autocracies, because they tend to pay higher wages in manufactures (Rodrik, 1999), have more protection to property rights (Amendola *et al.,* 2013), and prioritise the short-run consumption expenses over the long-run redistributive investments (Huntington, 1968). High rent-seeking behaviour and corruption practices also lead to higher inequality. On the other hand, democracies can show *lower* inequality levels since they have higher taxes to GDP ratios, higher secondary enrolment ratios, and perform more structural reforms (Brown, 1999; Acemoglu *et al.,* 2015).

Good *macroeconomic conditions and stability* can spur economic growth. If this growth is inclusive, it can reduce inequality (Ravallion, 2014; Kireyev & Chen, 2017). On the contrary, output volatility tends to increase inequality (López & Perry, 2008). The exchange rate regime, external and public debt, and domestic saving capacity are also macro variables linked to inequality (Cornia, 2011).

Finally, *external redistribution*, through foreign aid and microfinance, may also help to reduce income inequality (Cornia & Martorano, 2013). For instance, aid and microfinance flows may act as complementary resources for programmes to enhance labour skills, entrepreneurship and the quality of human capital, vocational training, the efficiency of labour market institutions, collective bargaining, and more, with the potential to benefit those in the low part of the income distribution. In the rest of this section we seek to explain in more detail the potential impact of aid and microfinance on income inequality.

The potential impact of aid and microfinance flows on income inequality:

Although both foreign aid and microfinance are funding tools for development and have very similar objectives, their characteristics and dynamics are not the same. The channels by which aid affects inequality may be different than those of microfinance. Therefore, it is important to analyse how each tool behaves and may affect income inequality.

Aid and microfinance can exert their influence on inequality indirectly (modifying public policies, political stability, macroeconomic management -e.g. through conditionality in the aid case-, and labour market and institutions), or directly, when the resources reach the poorest, assuming all the rest remains equal. In what follows we develop these channels in more detail.

Following with Figure 1, foreign aid can influence inequality through various channels (see Castells-Quintana & Larrú, 2015, for a detailed framework and evidence for Latin America). Firstly, aid can spur redistributive policies through technical assistance related to taxes and transfers, or even through conditionality linked to structural reforms and macroeconomic stability (e.g. low inflation rates and budget deficit). Multilateral aid is accustomed to this instrument (Temple, 2009). Programmes aimed at improving real exchange rates and terms of trade may help to reduce income inequality (Cornia & Martorano, 2013). Secondly, aid can be used for better governance. Aid

flows, especially when channelled through non-state actors, can strengthen trade unions activities, leading to better labour market institutions (European Commission, 2002). Thirdly, aid in terms of debt relief can also help improve income distribution (Ndikumana, 2004). This is expected if debt relief frees up resources to be invested in pro-poor projects such as debt-for-education (Cassimon *et al*., 2009), or debt-for-health swap programmes (Cassimon *et al*., 2008). In the same line, as aid is fungible, more public resources, in cash or in-kind transfers, may be channelled to the lowest income quintiles, improving income distribution. Fourthly, this aforementioned effect is even clearer if aid channelled through direct budget support is considered. Aid might feed the budgets for conditional cash transfer programmes. Their impact on inequality has been well documented in the literature (Lustig, 2011 and 2016), although their effects on inequality can be low if their volume is not big enough (Amarante & Brun, 2016; Bastagli *et al*., 2016). Finally, aid projects and programmes focused on education, nutrition and health care may have significant long-run impacts on earnings and opportunities for the destitute (Asiedu & Nandwa, 2007; Dreher *et al*., 2008; Wilson, 2011).

Microfinance —this is, financial services targeting small-scale entrepreneurial activities of the poor who may otherwise be financially excluded—[5] can also influence inequality. The primary goal of microfinance is to reduce disparities in the access to financial resources (Roodman, 2012). Financial markets have traditionally failed to reach the poor, as they lack collateral due to asymmetrical information problems, high transaction costs and difficulties enforcing contracts (Armendariz & Morduch, 2010). In most cases, the poor face great difficulties in acquiring the capital needed to save or to start up productive initiatives, and thus to improve their well-being (Robinson, 2001). By reducing information problems and transaction costs, microfinance extends financial intermediation—that is, reduces credit constraints on the poor— making it possible for them to take advantage of investment opportunities (Armendariz & Morduch, 2010). Financial market failures are actually considered to be one of the most important causes of inequality in developing countries (Hermes, 2014; Li *et al.*, 1998). Consequently, extending financial intermediation through microfinance services provides the possibility to finance more productive investments from the bottom segments of the population, and can therefore reduce income inequality (Dabla-Norris *et al*., 2015; Zahonogo, 2017).[6] Microfinance can thus have a positive impact on inequality reduction because it disproportionately gives opportunities to the poor rather than the rich (Hermes, 2014). However, contrary to this position, some authors have raised concerns and showed negative side effects of microcredits (see for instance Bateman, 2012). Specifically, authors such as Mansour and Mendel (2015) affirm that

5 Includes not only small-scale loans—known as microcredits—but also savings accounts, insurance, housing loans and other financial services to the poor (CGAP, 2009).
6 Ahlin & Jiang (2008) and Mahjabeen (2008) are two theoretical models finding that microfinance reduces inequality.

financial deepening will not reduce inequality, since low-income populations do not (and never will) benefit from any financial development.

In sum, when that aid and microfinance flows are able to reach the poorest, ceteris paribus, poverty and income are reduced. Our goal in this article is precisely to study how aid and microfinance relate to income inequality. In the next sections, we address the issue from an empirical perspective.

3. Data and descriptive analysis

3.1. Data

Our key dependent variable is income inequality (measured through the GINI index. Despite its acknowledged shortcomings (such as its higher sensitivity to the income of the middle classes than that of the extremes, or that two countries with very different distributions may yield the same value of the index), the Gini index is the most commonly used measure for income inequality. Three main sources provide world-wide cross-country inequality data: 1) The World Income Inequality Database (WIID), developed by UNU-WIDER,[7] 2) The *All the Ginis 1950-2012 Database,* developed by Milanovic (2014) and available at the World Bank,[8] and 3) The *Standardized World Income Inequality Database* (SWIID), developed by Solt (2009)[9]. Researchers must choose between comparability (homogeneous sources such as "identical" household surveys versus national accounts) and coverage (Jenkins, 2015; Cornia & Martorano, 2017).[10] Briefly, while SWIID allows for larger coverage, comparability is maximised with the *All the Ginis* database, which relies on household surveys only and is therefore considered to be more homogeneous. Given the nature of our panel data (yearly structure for developing countries), maximizing comparability is crucial and we consequently rely on the *All the Ginis* database.[11]

Our key independent variables are aid and microfinance. The first one, measured through the total net ODA received by each country and each year as a percentage of its GDP (*Aid*). Data for aid has been obtained from the DAC-OECD Database (OECD, 2017). The second one, the country's macro-scale of microfinance activities, has been measured through the microcredit

7 Available at: https://www.wider.unu.edu/project/wiid-–-world-income-inequality-database
8 Available at: http://data.worldbank.org/data-catalog/all-the-ginis
9 Available at: http://myweb.uiowa.edu/fsolt/swiid/swiid.html
10 Cornia & Martorano (2017) point out these shortcomings: survey design; assumptions and data harmonization; top incomes and tax returns; trends in the labour share of total incomes; assets held abroad; price dynamics between food process and overall CPI; and differences in the provision of the "social wage" across countries. Also see Ferreira *et al*. (2015) for a description of the characteristics and limitations of each database.
11 *SWIID* (Solt, 2009) and *All the Ginis* (Milanovic, 2014) correlate highly. We perform some robustness analysis using *SWIID* data. We have also done some robustness checks using other inequality indices when available. For Latin American countries, for instance, we have Theil and Atkinson values (from SEDLAC), and their correlation with Gini coefficients is higher than 0.95 in both cases, yielding similar results that when using the Gini.

gross-loan-portfolio as a percentage of the GDP in each country and each year (*MF*). This data comes from the Microfinance Information Exchange (MIX *MF*) Market database (Mix Market, 2015), the best and largest database on the microfinance sector (Cull *et al*., 2011). Today, the MIX Market database contains information provided by over 2,000 microfinance institutions (MFIs) throughout the world and covers nearly 100 million borrowers.

Table A.1 in Appendix A defines all variables and their sources in detail (including control variables later used in the econometric analysis). The records collected from these sources were matched by country and year, and made comparable. After removing the country-year observations that could not be properly matched, we were left with an unbalanced panel-data set covering a total of 87 developing countries over the period 1995–2012. Data limitations such as missing values limit the analysis to this period. A list of the countries in our sample is provided in Table A.2 of Appendix A.[12] Table A.3 of Appendix A provides summary statistics for all variables included in the analysis.

3.2. Descriptive analysis on aid, microfinance and inequality

Table 1 provides some descriptive statistics of our three key variables: inequality, aid and microfinance. As it can be seen, the mean level of inequality in our whole sample of developing countries is very high (Gini of 42.8). Concerning aid and microfinance, the volume of aid received by all the countries in our sample is more than five times higher than the total volume of microfinance activities implemented.

Looking at figures in different world regions, some interesting facts can be highlighted. Regarding inequality, Latin America & the Caribbean is the region with the highest average level, followed by Sub-Saharan Africa and the two Asian regions. Regarding aid, Sub-Saharan Africa is the region receiving the highest volumes (as share of its GDP). East Asia & Pacific also receives a large amount of its GDP in the form of aid, being South Asia and Latin America & the Caribbean the regions receiving the smallest share of their GDP in the form of aid. Concerning microfinance, the largest share of the total volume of microfinance activities is concentrated in East Asia & Pacific and Europe & Central Asia, followed by Latin America & the Caribbean. The smallest share of total microfinance is found in the Middle East & North Africa.

Figure 2 shows the evolution of inequality, aid, and microfinance in our sample (mean across countries). As it can be seen, the volume of aid received has remained relatively constant over the analysed period, while microfinance has experienced a steady growth. Inequality shows more variability, with a significant increase since 2008. More details of these evolutions by world regions can be observed in Figure B.1 in Appendix B.

12 The sample comprises all countries that are foreign aid recipients and that have a microfinance sector, that is, all countries for which there are data on aid and microfinance.

TABLE 1. DESCRIPTIVE STATISTICS, WHOLE SAMPLE AND BY REGION (2000 - 2012)

	Inequality				Aid				MF			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Whole sample (87)	42.8	10	17.5	69.8	2.2%	3.2%	-0.30%	24.3%	0.42%	0.78%	1.33e-06	9.2%
Regions												
East Asia & Pacific (8)	38.8	6.0	28.1	53.6	2.7%	5.4%	-0.16%	24.1%	0.69%	1.29%	0.000%	6.3%
Europe & Central Asia (18)	33.7	5.5	17.5	44.7	1.4%	1.1%	0.22%	4.3%	0.63%	0.98%	1.33e-06	9.2%
Latin America & Caribbean (19)	51.1	4.5	38.4	59.4	0.8%	1.9%	-0.30%	20.6%	0.55%	0.87%	0.0000%	5.9%
Middle East & North Africa (9)	36.1	3.2	30.8	40.8	2.3%	4.1%	0.04%	20.1%	0.09%	0.15%	0.0002%	0.8%
South Asia (5)	34.1	4.2	29	43.2	0.5%	0.5%	0.27%	1.7%	0.18%	0.22%	0.0004%	0.9%
Sub-Saharan Africa (28)	43.9	9.0	27.9	69.8	3.6%	2.9%	0.60%	24.3%	0.26%	0.35%	0.0003%	2.5%
N° observations	467				1061				1060			

Note: Numbers in parenthesis indicate the number of countries per region.

Fig. 2. Evolution of aid, microfinance and inequality

Authors' elaboration with data from: Milanovich (2014); MIX Market (2015); OECD (2017).

Table 2 shows correlations between our key variables, for the whole sample and by world regions. We find a negative correlation between aid and inequality and between microfinance and inequality for the whole sample, although they are very low (-0.14 and -0.04 respectively). When we analyse by regions, we find no clear pattern. Only for East Asia & Pacific we find negative and relatively high correlations between aid and inequality and between microfinance and inequality. Regarding aid and microfinance, there seems to be no significant correlation between the two (except in Middle East & North Africa where it is 0.77).[13]

13 For more details on the correlations between our key variables by world region see Figures B.2 and B.3 in Appendix B.

Table 2. Correlations among key variables, whole sample and world regions

	Inequality - Aid	Inequality - MF	Aid - MF
World	*-0.144*	-0.037	0.021
East Asia & Pacific	*-0.364*	*-0.48*	*0.479*
Europe & Central Asia	0.058	-0.006	*0.306*
Latin America & the Caribbean	*0.285*	*-0.162*	*0.182*
Middle East & North Africa	0.039	0.129	*0.772*
South Asia	*0.463*	0.108	0.182
Sub-Saharan Africa	-0.156	*-0.268*	-0.072

Note: Pearson correlations calculated by authors. Italic numbers indicate significance at 5% level.

4. Econometric analysis and results

To complement the descriptive analysis carried out in the previous section, we perform a simple econometric analysis of the relationship between aid and microfinance flows and income inequality. To quantitatively capture all direct and indirect effects, we would have to evaluate each specific mechanism discussed in Section 2. As most of the existing evaluations do not focus on distributive effects of aid, this is difficult to do. In line with previous studies, we have instead decided to look at the aggregate effect of microfinance and aid relying on a reduced-form specification. To do this we run cross-country regressions where we control for possible relevant factors associated with inequality. Hence, we use our panel data to estimate a model like the one in Equation (1):

$$Inequality_{it}=\alpha_1 MF_{it-1}+\beta Aid_{it-1}+\psi X_{i\,t-1}+\varepsilon_{it} \quad (1)$$

Where $Inequality_{it}$ is income inequality, measured through the Gini Index, in country i in time t; MF is the macro scale of microfinance activities, measured through the Gross Loan Portfolio as percentage of the GDP, in country i in time t; Aid_i is foreign aid, measured through the net ODA received as percentage of the GDP; X potential factors influencing income inequality, and ε_{it} a country-time specific shock.

As control variables *X*, we follow the literature and include those variables that have shown to be related to income inequality and explained in Section 2 (see Table A1 in Appendix A for all the details).

We estimate Equation (1) considering as many countries as possible and the longest time span depending on data availability: 1995-2012. All right-hand-side variables are included one period before to reduce problems of reverse causality. All estimations are done clustering errors at the country level. Time

effects are included to control for global shocks. Several panel data techniques are implemented, including Ordinary Least Squares (pooled-OLS), Random Effect (RE) and country-Fixed Effects (FE), to control for country-specific characteristics.

4.1. Main results

Table 3 presents main results. Columns 1 and 2 display pooled-OLS estimates: while column 1 only considers our two key variables, MF and Aid, column 2 introduces main controls. Column 3 displays RE estimates and column 4 displays FE estimates. Column 5 displays FE estimates but considering data only from the year 2000 onwards, as the quality of microfinance data before 2000 is very scarce (Mix Market, 2015). Finally, column 6 considers quadratic associations between our key independent variables and inequality.

Table 3: main results

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: *Inequality* (Gini Coefficient)						
MF(t-1)	-22.324	-49.785	-158.236***	-150.778***	-129.708**	-146.198
	(124.543)	(79.087)	(50.118)	(52.327)	(58.929)	(119.370)
Aid(t-1)	-75.549*	-33.170	-22.719	-22.967	-8.868	-117.609*
	(43.393)	(51.991)	(28.250)	(30.232)	(18.797)	(67.820)
MF(t-1)^2						-625.884
						(2010.748)
Aid(t-1)^2						390.713*
						(212.587)
Year FE	YES	YES	YES	YES	YES	YES
Country Effects	NO	NO	RANDOM	FIXED	FIXED	FIXED
Controls	NO	YES	YES	YES	YES	YES
Observations	377	321	321	321	288	288
No. of countries	76	67	67	67	67	67
Note: Controls include *GDPdeflator, Eco_growth, Gov_exp, FDI, Democ*, all lagged one period. In columns 1 to 4 the time span goes from 1995 to 2012. In column 5 the time span goes from 2000 to 2012. Robust standard errors (clustered by country) in parentheses. *** p<0.01, ** p<0.05, * p<0.1						

Results in Table 3 yield negative coefficients for both microfinance and aid. However, the coefficient for aid is only statistically significant in column 1, while the coefficient for microfinance is significant in columns 3, 4 and 5 (RE and FE estimates). OLS estimates capture both variation between countries as well as variation within countries over time, and can be considered as capturing a

long-run association (Baltagi & Griffin, 1984; Pirotte, 1999). By contrast, FE estimates consider only variation within countries over time, so results can be interpreted as related to the short run (Partridge, 2005). Taking this into account, our results would suggest that aid may be significantly associated with inequality in the long run, and microfinance may be significantly associated with inequality in the short run.

Further, since results in Table 3 may hide potential non-linearites in the relationship between microfinance and aid flows and income inequality, in line with Shafiullah (2011), we explore this possibility considering quadratic effects for aid and microfinance (Column 6 in Table 3). We find a significant U-shaped relationship between aid and inequality; inequality first decreases, then increases with aid. This could also suggest different patterns across countries in the allocation and impact of aid.

As a robustness check to results in Table 3, we have estimated the same regressions but considering microfinance and aid flows in per capita terms. We have also aggregated the data in 3-year periods, to reduce short-run noise but at the expense of losing observations. Results are presented in Table C.1 in Appendix C. Coefficients for microfinance and aid keep their negative signs, but are no longer significant.

4.2. Results by world region

Given the nature of our results so far, in Table 4 we explore potential differences across world regions in the association between microfinance and aid and inequality. To do so, we introduce regional dummies and interact our key variables, *MF* and *Aid*, with these dummies. As in Table 3, we present results by OLS (with and without controls), RE and FE.

Results in Table 4 show substantial differences across regions. For microfinance, the coefficient is always negative and significant for Latin America & the Caribbean. For East Asia & Pacific, we also find a negative coefficient, significant under RE and FE estimates. For the other regions, we find no significant coefficients under any estimation technique. For the case of aid, the results have an even more unclear pattern. In East Asia & Pacific, the results are similar to those of microfinance: a negative coefficient, significant under RE and FE. For Latin America & the Caribbean, the results are somehow unexpected; there is a positive and significant coefficient under OLS and RE estimates. For South Asia, the coefficient is also positive and significant under OLS, but becomes negative and significant under RE and FE. For the Middle East & North Africa, we find a positive and significant coefficient under RE and FE estimates. Finally, for Sub-Saharan Africa we find non-significant results.[14]

14 However, when we consider non-linearites by regions, we do find significant results for aid in SSA; inequality first declines with aid to then increase. In fact, our significant quadratic relationship between aid and inequality found for the world sample seems to be driven by countries in SSA and Europe and Central Asia.

These mixed results found by region point towards the difficulty of generalizing about the relationship between aid and microfinance and inequality. In any case, results suggest that the negative coefficients for microfinance found in Table 3 are mainly driven by countries in Latin America and East Asia & Pacific. However, for the case of aid, negative results seem to be mainly driven by East Asia & Pacific, with other regions displaying opposing (positive) coefficients.

Table 4: results by world region

		(1)	(2)	(3)	(4)	(5)
Dependent variable: *Inequality* (Gini Coefficient)						
*MF**						
	East Asia & Pacific	-303.018	-114.817	-397.694*	-598.694**	-640.956***
	Europe & Central Asia	136.034	98.810	122.188	121.856	174.517
	Latin Ame & the Caribbean	-100.404*	-99.718*	-166.065***	-169.275***	-171.517***
	Middle East & North Africa	592.811	871.997	176.195	306703	196871
	South Asia	-233.286	137.465	-29.666	-140.577	-259.688
	Sub-Saharan Africa	-346.799	-195.174	397.409	513.793	442338
*Aid**						
	East Asia & Pacific	-186.912	-208.561	-433.869**	-870.041***	-992.591***
	Europe & Central Asia	-42.786	-79.943	-2.431	-4.272	-45264
	Latin Amer & the Caribbean	178.715***	172.665***	118.555**	86098	108103
	Middle East & North Africa	-6.82	-121.046	355.728**	499.034***	349.129**
	South Asia	264.800***	375.798***	-524.381*	-983.982**	-942.552**
	Sub-Saharan Africa	-38.083	-34.520	-16.245	-18.889	2.401
Year FE		YES	YES	YES	YES	YES
Country Effects		NO	NO	RANDOM	FIXED	FIXED
Controls		NO	YES	YES	YES	YES
Observations		377	321	321	321	288
No. of countries		76	67	67	67	67

Note: Controls include *GDPdeflator*, *GDP_growth*, *Gov_Consump_Exp*, *FDI*, *Democ*, all lagged one period. Regional dummies are included in columns 1 to 3. In columns 1 to 4 the time span goes from 1995 to 2012. In column 5 the time span goes from 2000 to 2012. Robust standard errors (clustered by country) in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

It is also important to notice that our results so far only highlight associations between microfinance and aid and inequality; although we lagged right-hand-side variables and included several controls, our results cannot be interpreted in causal terms. Regarding aid, poorer countries tend to have higher levels of inequality in general and are, therefore, subject to higher external aid flows. In this case, our coefficient for aid would be biased towards a positive sign, which may partially explain why we find some positive coefficients. Consequently, a negative coefficient for aid would represent an upper bound of an unbiased result, which would support a negative association of aid with inequality. Regarding microfinance, our regional results are in line with what we found in Table 3; that there does not seem to be a clear pattern with inequality when one analyses the cross-sectional variation (OLS and RE estimates), but only when one controls for country fixed effects (FE estimates).

5. Case studies

Results found so far suggest that the association between microfinance and aid flows and inequality vary depending on the world region considered, and therefore very likely to be context specific. To go deeper into this line of reasoning, we have considered three case studies (from the regions where we have found significant coefficients for aid and microfinance): Bolivia as a Latin American country, Bangladesh as a South Asian case, and Indonesia as an East Asia and Pacific one. These are aid-recipient countries and have accumulated large experiences with microfinance. As it can be seen in Table 5, inequality and aid flows have fallen in the three cases, especially in Bolivia. On the contrary, microfinance has remarkably increased in the three countries.

Table 5. Inequality, aid and microfinance in three case studies

	Gini index		Aid (%GDP)		MF (%GDP)	
	1995	2012	1995	2012	1996*	2012
Bangladesh	32.7	31.7	1.030%	0.500%	0.002%	0.668%
Bolivia	58	43.6	3.141%	1.090%	0.330%	5.928%
Indonesia	34.2	32.3	0.150%	0.003%	0.005%	0.467%

Notes: * we select 1996 as the first year with comparable data. Data for Indonesia is 1997. Authors' elaboration with data from: Milanovich (2014), MIX Market (2015), & OECD (2017).

Bolivia:

Bolivia has developed a huge and very successful microfinance industry since the early eighties. Today, there are 29 microfinance service providers, from which *BancoSol*, *Banco Fassil*, *Banco FIE* and *Banco PRODEM* are the four biggest entities. All of these 29 institutions are offering microfinance services to 1.25 million people (MIX Market, 2017) and have developed

the largest ranges of microfinance design technology in Latin America, and possibly the world (Mosley, 2001). Innovations in lending technologies and market saturation have made Bolivia one of the most rapidly growing and competitive microfinance markets in the world (Navajas *et al*., 2003), having also one of the wider and deeper coverage among the lower income social sectors and financially excluded segments of the population (Arriola, 2003). This last point may be one of the reasons why we have found a negative and significant association between microfinance and income inequality in Latin-American countries. Another reason may be the positive impact of microfinance on human capital formation (see Maldonado and González-Vega, 2008). These authors found that in Bolivia, children from poor rural households with access to microfinance services were kept in school longer than children from households without access to these services. Among the channels through which microfinance influence human capital formation, these authors identified the increased household income that resulted in higher schooling expenditures and longer and sustained enrolment over time. All this contrasts with the non-significant results for the case of aid in Latin America, where aid flows received have experienced an important decrease (in Bolivia for instance from 3.4% of the GDP in 1996 to 1% in 2012). Moreover, aid to Bolivia and other Latin-American countries has been focused on social infrastructure and services (36 per cent of the total ODA) and debt relief (31 per cent). The potential influence of these flows over income inequality may be low, at least in the short run. Moreover, 20 per cent of aid to Bolivia was channeled through technical cooperation, but none of those programs were related to fiscal policies or tax administration support.[15]

Indonesia:

In East Asia & Pacific we found a negative and significant association between microfinance and inequality and between aid and inequality. Many countries in this region are well-known for their large-scale and well-developed microfinance sector. In Indonesia, the vibrant microfinance market reached 1.2 million of active borrowers and 570 million of depositors in 2015 (Mix Market, 2017). Microfinance began in the country in 1970 with the *Bank Dagang Bali*, but attained nationwide coverage with the opening of *Bank Rakyat Indonesia* (*BRI*) in 1984. Today, there are around 50 MFI reporting to Mix Market, among which *Bank Tabungan Pensiunan Nasional* (BTPN), *Bina Artha* and *BRI* are the most powerful microfinance firms in the country. Also, Indonesia is another country where microfinance has a very wide and deep coverage among the lower income social sectors. For this reason, Robinson (2001) defines a financial revolution in Indonesia based on the increase in the availability of financial services in rural areas and low-income urban neighbourhoods, not exempt from some criticism (Gerber, 2013). Concerning aid, Indonesia, contrary to Bangladesh and Bolivia,

15 Bourguignon *et al*. (2009) found that aid has an extremely small impact on inequality but near half of it is removed when technical cooperation and debt relief are deducted.

has received a big sum of humanitarian aid, especially after the tsunami of 2004.[16] These aid flows may have had an egalitarian effect by helping affected people rebound and therefore narrow income differences with those not affected. Also, community-based programmes in Indonesia have been able to elude rent-seeking behaviour by elites (see Dasgupta & Bear, 2007).

Bangladesh:

Finally, in South Asia we found a negative and significant association between aid and inequality, but not for microfinance. In countries like Bangladesh, contrary to what happens for instance in Bolivia, nearly half of the aid flows are loans (46 per cent for our time span 1995-2012) instead of grants.[17] About one third of the aid programs in Bangladesh were channeled through multilateral institutions. 20 per cent of aid flows were to develop economic infrastructure[18] and services, and 8 per cent for General Programme Assistance. As Clemens *et al*. (2012) has shown, these types of aid have a positive impact on economic growth, and might have also helped to reduce inequality. As the figures are similar for the rest of the south Asia region, it might be possible to extend the association to the region. Concerning microfinance, programs cover only a very low percentage of the total population and GDP, despite the well-known case of the *Grameen Bank*, (see Table 5).[19] In fact, evaluations have shown that, although microcredits have tried to focus on the poorest, the instrument has had limited success in helping households escape from poverty (Roodman & Morduch 2012; Hossain 2012), and therefore in reducing the overall level of inequality.

6. Conclusions

In this article, we have studied the co-evolution of aid, microfinance and income inequality. To do this, we have relied on panel data for 87 developing countries from 1995 to 2012. We have based our empirical analysis in a detailed theoretical discussion of the potential associations between aid and microfinance flows and the evolution of income inequality. We have further complemented our analysis with three specific case studies (Bolivia, Bangladesh and Indonesia).

Our theoretical discussion in Section 2 allows us to expect a positive relationship between microfinance and aid flows and reductions in inequality in many developing countries. We have found some evidence (Sections 3 and 4) suggesting that in some world regions this may have been the case.

16 On average, humanitarian aid was 8 per cent of the total ODA in Indonesia, 3.8 per cent in Bangladesh and near 1 per cent in Bolivia.
17 In Bolivia, 76 per cent of the ODA flows were grants.
18 Only 7 per cent in the case of Bolivia and 10 per cent for America's region.
19 In 2015, the total number of MFI borrowers and depositors in Bangladesh was 15.8 and 19.2 million respectively.

Nevertheless, our results do not allow us to derive unambiguous conclusions about the impact of microfinance and aid on inequality. Neither microfinance nor aid flows seem to be a panacea to lower inequality. The impact of microfinance and aid on inequality seems to depend on the specific context as well as on many other factors. Consequently, our results question simplistic claims on the effectiveness of aid and microfinance flows without considering specificities on the allocation of the flows, programs funded, recipient characteristics, and several other contextual factors. As our study of the specific cases of Bolivia and Indonesia highlights, when microfinance flows reach the lowest-income and financially excluded segments of the population, they can help in reducing income inequality. For the case of aid, flows to economic infrastructure and productive sectors, loans, and humanitarian responses focused on the poorest (instead of aid for debt relief or pure technical assistance) may be more desirable to improve income distribution.

Given the importance of reducing income inequality, and our limited knowledge to date, increasing our understanding of the macroeconomic effects of aid and microfinance on inequality arises as a valuable goal for both academics and policy makers. Policy makers might consider aid, microfinance, or both, as instruments to reduce income inequality. However, the effectiveness of these instruments is not guaranteed; as we have shown it highly depends on several contextual factors. Further research and country-specific studies and evaluations are clearly needed in this regard.

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Appendix A

Table A.1. List of Variables, Description, and Data Sources

Variable	Description	Data source
A: Dependent variable		
Inequality	Gini index	All the Ginis (Milanovic, 2014)
B: Key variables of interest		
Aid	Official Development Assistance (ODA), expressed as a fraction of GDP, measured in current USD	OECD (2017)
MF	Gross Loan Portfolio (GLP), expressed as a fraction of GDP, measured in current USD	MIX Market (2015)
C: Control variables		
GDP Deflactor	Inflation rate. Annual growth rate of GDP deflator, expressed in %	World Development Indicators (World Bank, 2015)
GDP Growth	Annual percentage growth rate of GDP, measured in constant 2005 USD	World Development Indicators (World Bank, 2015)
Government Consumption Expenditure	General government final consumption expenditure, expressed as a fraction of GDP	World Development Indicators (World Bank, 2015)
Foreign Direct Investment	Foreign direct investment, net inflows expressed as a fraction of GDP	World Development Indicators (World Bank, 2015)
Democracy	Democracy Index (1-10)	Polity IV Database (Polity IV, 2012)

Table A.2. List of Countries Analyzed

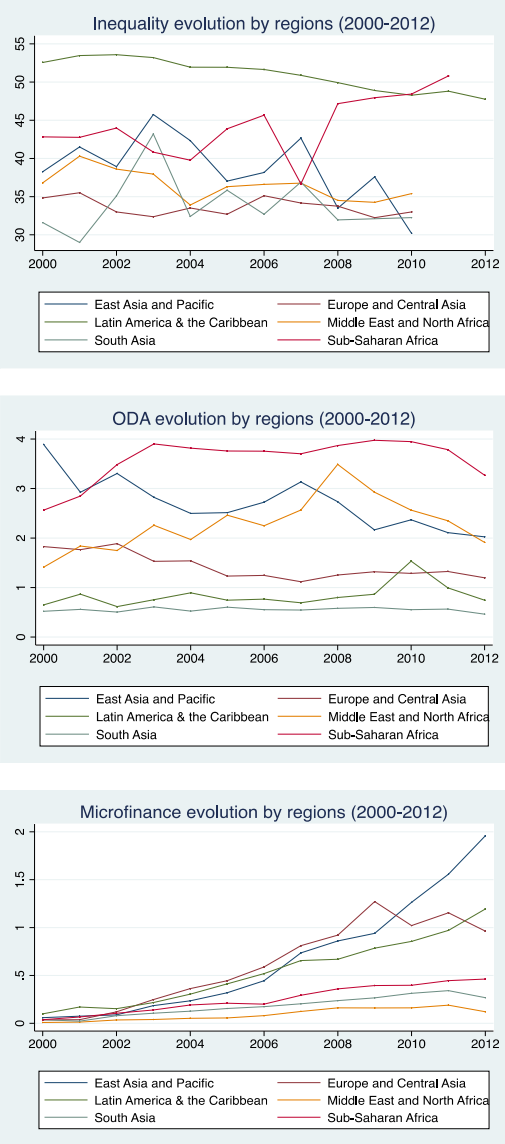
Albania	Congo Dem Rep	Iraq	Nigeria	Tanzania
Argentina	Congo, Rep.	Jordan	Pakistan	Thailand
Armenia	Costa Rica	Kazakhstan	Panamá	Togo
Azerbaijan	Cote d'Ivore	Kenya	Paraguay	Tunisia
Bangladesh	Dominican Rep	Kyrgyz Rep	Peru	Turkey
Benin	East Timor	Lebanon	Philippines	Uganda
Bolivia	Ecuador	Macedonia	Poland	Ukrania
Bosnia& Herz.	Egypt, Arab Rep.	Madagascar	Romania	Urugay
Brazil	El Salvador	Malawi	Russia	Uzbekistan
Bulgaria	Ethiopia	Mali	Rwanda	Venezuela, RB
Burkina Faso	Georgia	Mexico	Senegal	Vietnam
Burundi	Ghana	Moldova	Serbia	W Palestina
Cambodia	Guatemala	Mongolia	Sierra Leone	Yemen, Rep.
Cameroon	Guinea	Morocco	South Africa	Zambia
Chad	Haiti	Mozambique	Sri Lanka	Zimbawe
Chile	Honduras	Nepal	Swaziland	
China	India	Nicaragua	Syrian Ar Rep	
Colombia	Indonesia	Niger	Tajikistan	

Table A.3. Descriptive Statistics

Variable	Number Obs.	Median	Mean	Standard Dev.
	638	42.6	42.9	9.58
	1202	0.0009	0.004	0.007
	1458	0.11	0.22	0.32
	1540	7.37	16.31	80.19
	1359	0.27	0.28	0.51
	1466	12.62	13.44	4.77
	1436	6	4.97	3.44
	1483	2.54	3.71	4.57

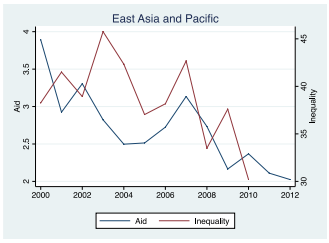
Appendix B

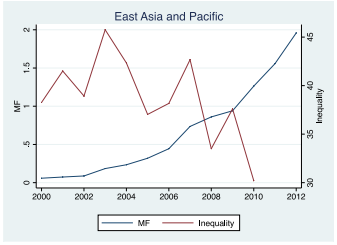
Fig. B.1. Evolution of inequality, aid and microfinance by world regions

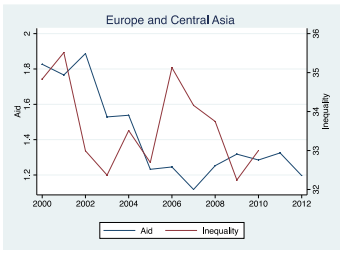


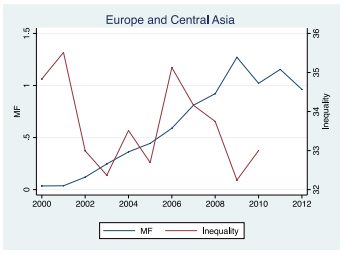
Authors' elaboration with data from: Milanovich (2014), MIX Market (2015), & OECD (2017).

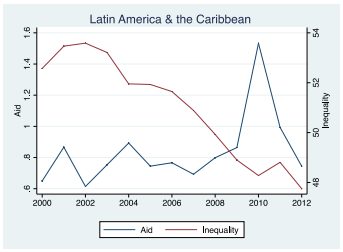
Fig. B.2. Joint evolution of Aid and Inequality, and MF and Inequality, by world regions

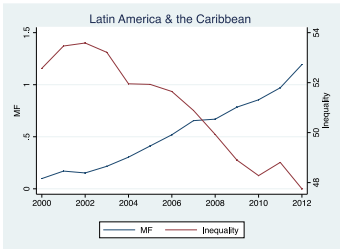


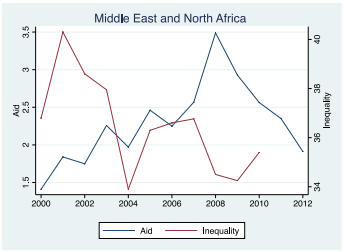


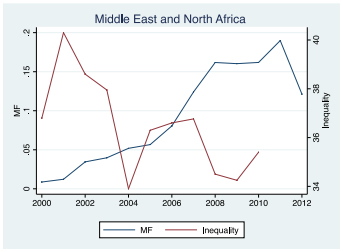


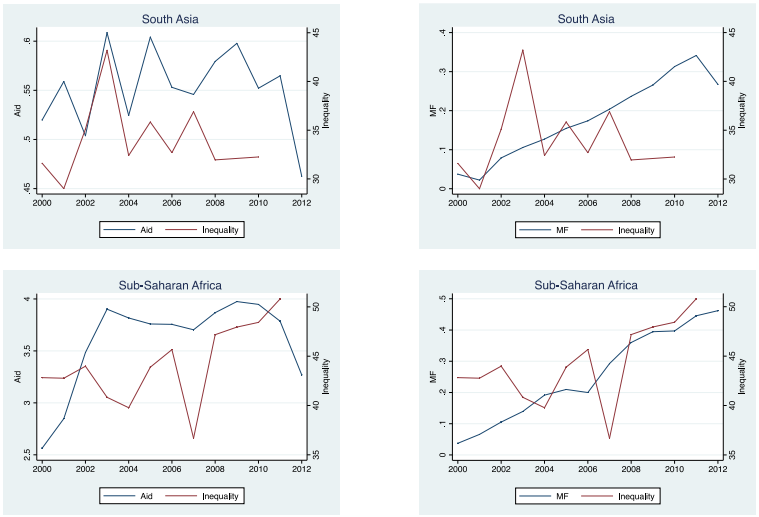






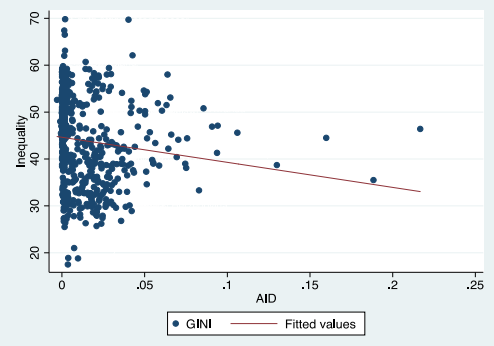


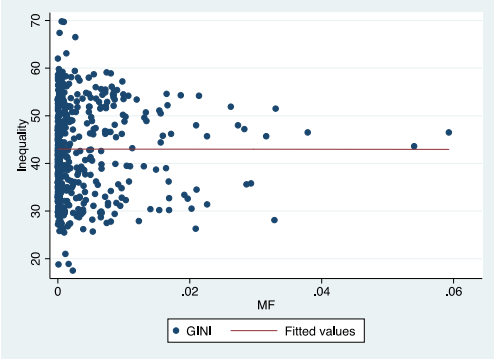


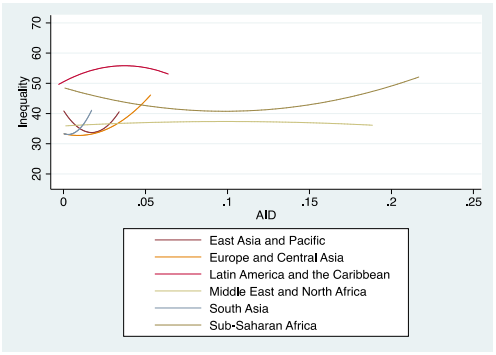


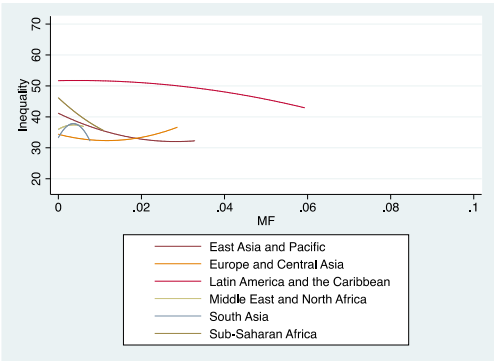
Authors' elaboration with data from: Milanovich (2014), MIX Market (2015), & OECD (2017).

FIG. B.3. SCATTERPLOTS BETWEEN AID AND INEQUALITY, AND MICROFINANCE AND INEQUALITY (WHOLE SAMPLE AND WORLD REGIONS)









Authors' elaboration with data from: Milanovich (2014); MIX Market (2015); OECD (2017).

Appendix C

Table C.1 Main results, 3-year periods

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: *Inequality* (Gini Coefficient)						
MF(t-1)	-25.1485	-103.348	-172.044*	-139.548	-166.455	188.329
	(163.953)	(132.537)	(89.411)	(113.682)	(103.780)	(178.446)
Aid(t-1)	-9.48e-10	-9.71e-10	-6.99E-10	-1.24E-10	-8.77E-10	-8.89E-10
	(5.74e-10)	(2.16e-09)	(1.37e-09)	(1.58e-09)	1.40e-09	(1.87e-09)
MF(t-1)^2						-9523.172***
						(3537.62)
Aid(t-1)^2						2.75E-09
						(2.60e-08)
Year FE	YES	YES	YES	YES	YES	YES
Country Effects	NO	NO	RANDOM	FIXED	FIXED	FIXED
Controls	NO	YES	YES	YES	YES	YES
Observations	126	118	118	118	114	114
No. of countries	58	54	54	54	54	54
Note: Controls include *GDPdeflator, Eco_growth, Gov_exp, FDI, Democ*, all lagged one period. In columns 1 to 4 the time span goes from 1995 to 2012. In column 5 the time span goes from 2000 to 2012. Robust standard errors (clustered by country) in parentheses. *** p<0.01, ** p<0.05, * p<0.1						