Macroeconomic consequences of inequality.
The case of investment.

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Abstract.

This paper explores the relationship between inequality and investment based on a panel for 95 countries. It considers a wide range of determinants and econometric methodologies. This work improves the existing literature because (i) it connects inequality with investment; (ii) it controls by a wide set of variables contrasting different theoretical approaches; (iii) the sample includes advanced and developing countries; and (iv) it tests for a possible nonlinear relationship.

The paper documents a concave and non-monotonic ("U-shape") relationship between inequality and investment. At low levels of initial inequality, an increase in inequality is associated with lower investment; but at high levels of initial inequality the relationship is positive. The differentiation between advanced and emerging countries shows some specific features of the control variables. Given the high correlation between the wage share and inequality, policies of wage restriction cause inequality to increase, thus generating lower investment and growth when countries present low or middle levels of initial inequality. With high levels of initial inequality, the result is the opposite, so it is possible, if such countries are open economies (i.e. “export-led”), that they can fall into a high-growth with high-inequality trap where only government policy can push the country to the other side of the “U.”

Keywords: Investment, Inequality, Panel data, GMM; International comparison, Financial Openness, Nonlinear relationship.

JEL: C23, D25, D33, D63, F41, F62,

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1. Introduction.

Inequality has returned to the center of the macroeconomic agenda. Since the 1990s, there has been a growing interest in inequality. This was especially important in academic fields, but with the eruption of the international financial crisis that started in 2007, the interest expanded to other fields as well. In particular, the interest in inequality has returned to the domestic economic policy debate in most countries, and to policy discussion in international organizations. The objective fact is that there is a large consensus that inequality has grown since 1990 in Europe, North America, Asia, and the Middle East. Further, it has decreased only slightly in Latin America and Africa, which both started with very high levels of inequality. (Alvaredo et al., 2018; IMF, 2017).

Simultaneously, aggregate investment has shown very heterogeneous dynamics among countries in the last decades. Advanced economies saw their share of total global investment fall from an average of 18.5 percent in the 1970s to 14.5 percent in the ten years up to 2015, while in the same two periods, developing countries' relative share went from 2.6 percent of global investment to 9.3 percent (IMF, 2017). This process occurred simultaneously with a deterioration in global growth that has been considered the manifestation of a long period of secular stagnation caused by the insufficiency of aggregate demand (Summers, 2015). All these events have materialized during a period characterized by a generalized process of international opening and deregulation across countries. This economic globalization occurred in both commerce and finance.

In this dynamic macroeconomic framework, aggregate investment is a key variable to explain cyclical and potential growth. Although there is a recent consensus in the literature that high levels of inequality negatively affect growth, there is no consolidated evidence that investment can be a channel through which changes in income distribution and inequality affect growth.

The aim of this paper is to analyze the behavior of aggregate investment in the medium and long term, controlling for the role that income inequality may play. The hypothesis tested is that inequality is a very important determinant of the behavior of investment in gross fixed capital formation, and through this channel can affect growth. Through the testing of this hypothesis, it is possible to appreciate how the impact of variables that are typically used in investment regressions (Phillips et al., 2016) is modified in open economies when controlled by the role of inequality.

The work is organized as follows. Section 2 discusses the theoretical literature, while Section 3 analyzes the previous empirical evidence. Sections 4, 5 and 6 present the empirical model, the econometric methodology, and the results, respectively. Finally, Section 7 concludes.

2. Theoretical framework. Inequality, growth and investment

In a context of disappointment with global growth, a key question is whether the changes in inequality in different countries in the last decades affected, in some way, the behavior of the investment (in physical and human capital) and, through this channel, have contributed to the deterioration of the effective and potential growth of most countries.

As early as the 1990s, the experience of the Asian countries had caused some questioning of the prevailing understanding of the relationship between inequality and growth. Stiglitz (1997) raised the idea of a causality that was inverse to that postulated by Kuznets (1955)—Kuznets held that inequality is a result of the passage to different stages of development. Galor

and Zeira (1993) formulated a model with heterogeneous agents in which inequality affects economic growth in different ways. However, it is only since the international financial crisis that began in 2007 that greater attention has been given to the role of inequality in the explanation of macroeconomic dynamics. This interest is manifested both at an academic level (Stiglitz, 2012, 2015; Piketty, 2014; Rajan, 2010; Milanovic and Weide, 2014), and in the main international organizations such as the World Bank (Ferreira et al., 2012), the OECD (Cingano, 2014; OECD, 2015), and the IMF (Ostry et al., 2014).[2] Even archetypal entities of the global financial system such as Standard and Poor's and Citibank have conducted in-depth studies on the subject expressing concern about the macroeconomic and social role of inequality (Standard & Poor's, 2014; Citi, 2017).

Although not fully consolidated, the existing empirical evidence suggests that high levels of inequality have a negative effect on growth. Given that most of the regressions are reduced forms of this relationship, there is much less evidence of what the mechanisms are through which inequality affects growth, and how they act in practice. In fact, there are several channels through which inequality might interact with growth. Bearing in mind that various authors, such as Barro (1991), Sala-i-Martin (1997), and Levine and Renelt (1992), have shown that the rate of fixed capital formation is a fundamental determinant of economic growth, it is crucial to ask to what extent inequality could affect investment and thus potential and actual growth of the economy. To this end, this paper focuses mainly on the direct impact that inequality could have on investment in physical capital.

In economic theory, several visions coexist with respect to the impact of inequality on growth that would be channeled through investment. Four aspects must be considered to classify those theories: 1) the role of inequality as a microeconomic incentive; 2) the relationship among inequality, aggregate demand, and investment; 3) the interaction among inequality, savings, and financial markets; and 4) the impact of inequality on economic policy choices. Additionally, these aspects can interact with each other.[3]

2.1. The role of inequality as a microeconomic incentive

Regarding microeconomic incentives, on the one hand, there are traditional neoclassical models that emphasize the idea of a trade-off between allocative efficiency and equity (Mirrless, 1971; Becker, 1977; Friedman and Friedman, 1979). These models postulate that inequality performs a positive role, as an incentive for less well-off individuals to increase their effort and improve their relative situation. This induces them to invest more in physical capital to increase the productivity of a company, or in human capital to increase the individual productivity of the labor factor. Bourguignon (1981) formalizes different degrees of inequality in a Solow model and shows that the context of inequality produces a higher output for all individuals; therefore, the Pareto result predominates over the egalitarian one. Also, according to Lazear and Rosen (1981), inequality is a positive incentive for entrepreneurship and innovation. In a complementary way, the clear normative implication of this approach is that attempts to redistribute income or distort incentives can lead to investments being directed to less productive sectors or not being realized (Okun, 1975).

Other authors, such as Perotti (1996), and Aghion, Caroli, and Garcia-Peñalosa (1999), have suggested that the growing inequality is a disincentive for the investment in human and physical capital by the poorest sectors due to unequal access to opportunities, and therefore, is negative for growth. Specifically, by concentrating income and excluding certain strata of the population from access to quality education, inequality discourages effort and reduces competition, and therefore reduces the ability to innovate in an economy.

[2] For an analysis of global inequality see the "World Inequality Report 2018" (Alvaredo et al., 2018).

[3] See Carrera and Rodríguez (2016) for an exhaustive survey of the different visions regarding the relationship between macroeconomics and inequality.

In the traditional neoclassical models, the output tends to be seen as the result of firms' investment decisions regarding the stock of capital that is combined with other productive inputs. The cost of capital plays a central role in this vision. However, empirical evidence has shown that investment is more correlated with output than with the cost of capital (Shapiro, 1986). More precisely, causality seems to go strongly from the output to the investment.

2.2. The relationship among inequality, aggregate demand, and investment

A second group of theories suggest that the effect of inequality on investment is related to the role of aggregate demand. The most traditional channel is the investment accelerator (Samuelson, 1939); that is, the positive effect of GDP growth on fixed investment, because of higher cash flow and profits. Given that insufficient demand discourages investment via the accelerating effect, redistribution to sectors with a high propensity to consume would stimulate investment in the short term (Blecker, 2016).[4]

If the role of the credit market is incorporated with imperfect and asymmetric information, the principle of the financial accelerator describes an additional effect of demand shocks on the investment via the change in the price and the valuation of the assets used as collateral, which facilitates the realization of new investments (Bernanke, Gertler, and Gilchrist, 1996).

The interaction between inequality and aggregate demand has recently been highlighted in the US. Krueger (2012) shows that, if the 99th percentile had enjoyed the same growth in income that went to the top 1 percent between 1979 and 2007, aggregate consumption would have been 5 percent higher. But also, from a sectoral development perspective, insufficient demand can make unattainable the critical level necessary for certain types of investment, especially in certain industrial sectors, and thus reduce investment and growth.[5]

More structurally, some authors find that inequality plays a major role in the phenomenon called secular stagnation, which currently affects the international economy (Summers, 2015; Krugman, 2012). In their studies of the economy since the international financial crisis, Stiglitz, (2012, 2015), Cynamon and Fazzari (2016), and Palley (2015) find that high inequality was also responsible for the weak post-crisis recovery.

Analyses from a post-Keynesian theoretical perspective have placed great emphasis on the impact of functional income distribution on the behavior of aggregate demand (Bortz, 2014; Blecker, 2016). Stockhammer and Wildauer (2015) discuss in a unified model based on Bhaduri and Marglin (1990) the possibility that growth is influenced differently by income distribution, depending on whether the country has a regime that is wage-led or profit-led. It follows that the key variable in these analyses is the wage share in income. However, while the impact of (re)distribution in consumption is clearer, its relationship to investment may be more diffuse, and thus harder to specify.

2.3. The relationship among inequality, aggregate demand, and investment

A third level of analysis regarding the impact of inequality on investment is associated with the effective realization of investment through its financing. This involves determining how important the degree of completeness of the financial markets is and—at the aggregate level—the role of internal or external savings. The most traditional theoretical neoclassical framework

[4] The short-term impact is generally accepted. There is a more intense discussion among different macroeconomic scholars regarding the impact of demand shocks on investment and growth in the long term. Potential risks for the dynamic stability of the investment are also important in this discussion.

[5] Following the tradition of Lewis (1954), Baldwin (1956) and North (1959) with respect to the passage from the agricultural economy to an industrial economy that requires internal demand, in Murphy et al. (1989) the industrial take-off in developing economies is modeled justifying redistribution as a key device of the transformation process to compensate for the absence of international demand for new goods.

(outlined above) assumes perfect financial markets, so the financing of the investment is not a problem.

However, when the poorest strata of the population do not have the capacity to invest, despite having the possibility of obtaining high productivity from this investment, capital accumulation will be lower and, consequently, growth will be less than under the assumption of complete financial markets. From a modeling perspective that goes beyond the representative neoclassical agent, when postulating the heterogeneity of agents, Galor and Moav (2004) show a strong effect of the inequality in the results of the model.[6]

Additionally, with inequality there may be a deterioration of not only the quantity but also the quality of the investment, if there are decreasing returns to scale and each firm faces financial restrictions. A greater differentiation in income or wealth implies an increase in dispersion in the collateral, and therefore less access to funds for certain projects that may have higher returns than those finally chosen. These effects reduce the average return on investment (Banerjee, 2004).

In economies with financial restrictions or which are not completely open to international capital flows, the level of investment is strongly influenced by domestic savings. Authors such as Keynes (1939), Kalecki (1971), and Kaldor (1961) pointed out that total saving is determined by the marginal propensity to save, which is heterogeneous among the different social classes. If higher deciles of income have a greater marginal propensity to save, then a change in the income distribution favorable to them—as a reduction in the wage share in national income—would increase the saving of the economy and thus the financing available for investment. In this way, inequality would favor growth: greater aggregate saving would allow financing greater investment.

However, the theory of consumption cascades (or "Veblen effect") explains why there is no direct negative link between greater inequality caused by a redistribution toward capital and greater aggregate saving (Duesemberry, 1949).

According to the approach modeled by Frank et al. (2014), when there is a redistribution of income that would induce a fall (or relative fall) in consumption, especially in the middle deciles, households try to borrow to maintain higher levels of consumption despite their declining share of income. If this imitation effect were extended via financing, there would be an overall increase in indebtedness rather than an increase in savings. In a way, the rich save more and lend it to the rest of society so that the latter can maintain their previous levels of consumption (or chase the increased consumption levels of the rich). Therefore, there is no greater savings available for investment. The so-called "Veblen effect" or “imitation of consumption” is applicable in countries that have enough financial depth (Rajan, 2010, Frank et al., 2014). This would be the main way for the lowest deciles to sustain their proportionate level of consumption prior to redistribution. There have been no systematic measurements of whether this greater credit dedicated to household consumption generated a displacement effect in bank financing for investment.

The opening of economies to financial flows introduces another dimension in the relationship among savings, financing, investment, and growth. Feldstein and Horioka (1980) find that countries with low savings rates have low investment rates, which showed that the international financial integration of countries was low. Based in part on this work, several more recent studies have shown the importance of the capital account openness as a source of disparities between saving and investment, since such openness erases the correlation between savings and investment at the national level. In this sense, the 1990s marked an important structural change in terms of the levels of financial openness for the majority of the countries of the world. This has been supported by different studies, such as Chinn and Ito

[6] See Galor (2011) for a comprehensive overview of the evolution of this literature of the last twenty years.

(2006), which is why it should be understood as a relevant structural change in the study of empirical evidence.

2.4. The impact of inequality on economic policy choices

The fourth group of theories is the one that focuses on the problems of political economy that trigger greater inequality According to Gould and Hijzen (2016), the perception that a society is unequal and unjust can affect growth and investment at different levels. Examples of the effects on such a society include encouraging greater political sensitivity against the current structure, greater tax evasion and corruption, lower perception of legal security for investments, and greater searches for rent-seeking activities. Regarding fiscal policy, several authors (Persson and Tabellini, 1994; Alesina and Rodrik, 1994; and Perotti, 1996), point out that inequality generates a process called the "endogenous fiscal cycle." A growing inequality would induce electoral pressures for higher levels of taxes on business profits, physical capital or property (and even on the returns of human capital) reducing investment and therefore growth. In more acute cases, the perceived inequality stimulates political and socioeconomic reactions that generate uncertainty and political and social instability (Alesina and Perotti, 1996), or the lack of consensus to face macroeconomic shocks and cushion the business cycle (Rodrik, 1999), which increases macroeconomic volatility.

From the perspective of the persistence of inequality, Stiglitz (2012) points out that inequality increases the lobbying power of favored sectors to protect their privileges. Stiglitz shows that finances are the paradigmatic example of such a sector, but not the only one where this exercise of "revolving doors" and regulatory capture is enhanced

Finally, and beyond the different theoretical approaches, it is worth noting that the relationship between inequality and growth that has been analyzed in the different approaches is mostly modeled in linear terms. However, there is a very promising alternative that postulates a nonlinear link between inequality, investment, and growth. This literature is inspired by Kuznets's (1955) work on a relationship in the form of an "inverted U" between per capita income and inequality. The Kuznets hypothesis is basically a representation of a possible stylized fact about how inequality changes as the level of development of countries varies, determining, in principle, a causal relation. More recent papers, as we have shown, deal with different theoretical explanations and empirical evaluations, with contrasting results. But what is remarkable is that the likelihood of nonlinear behavior has recovered strength based on the works that posited inequality as a cause of different behaviors of aggregate output.

The model of Benhabib (2003) is an example of this work. Benhabib argues that increases in inequality from low levels generate positive incentives for growth, but when inequality is very high, they encourage rent-seeking behavior and reduce growth. Galor and Zeira (1993) present a model with imperfections in the credit market and indivisibilities in investment that serves as a basis to demonstrate that inequality affects growth in a differentiated way, according to its initial dimension. They find that an increase in inequality negatively affects per capita growth in middle and high-income countries and positively in poor countries, in both the short and long term. This is based on the differentiated form of capital accumulation in economies according to their stage of development, where physical capital in the early stages has increasing returns and the accumulation of human capital in the advanced stages has decreasing returns at the individual level.

In short, the survey of the literature shows, first, that the impact of inequality on investment has not been widely addressed and, in general, in the face of a theoretical ambiguity in the expected results, the empirical results are also limited in span (as we discuss below). In addition, on the same logic that has guided research on the growth impact of inequality, it is worth bearing in mind what Galor (2011, p. 32) points out: "Later studies have deviated from the desirable examination of the channels through which inequality may affect growth, and restricted their attention to the reduced form relationship between inequality and growth." In

the rest of this paper, the focus is on whether inequality is a determinant of investment, controlling for the rest of the traditional determinants studied so far by the literature.

3. Previous empirical evidence

Empirical evidence in the last two decades is generally favorable to the existence of a negative link between inequality and growth for long-term analyzes (Alesina and Rodrik, 1994; Easterly, 2007). In contrast, Li and Zou (1998) and Forbes (2000) find, using panel data, a positive or ambiguous relationship, the introduction of fixed effects in the regression models being critical in this change in the results (Banerjee and Duflo, 2003). On the other hand, Barro (2000), by not including fixed effects in the regression and changing the interval of years of each observation from five to ten, finds that inequality is negatively associated with growth in poor countries, but positively associated in rich countries.

Regarding the transmission channels, Perotti (1996) finds little support for those referred to in literature on the political economy of inequality as the "endogenous fiscal cycle" (in fact, inequality generates lower levels of taxes) and more support for the idea that inequality affects the accumulation of human capital and that the impact increases when the financial market imperfections increase. Banerjee and Duflo (2003) state that changes in inequality in any direction reduce growth in the next five years, which is why they argue that redistribution has negative effects on growth, at least in the short and medium term.

Regarding the so-called "growth events," Berg et al. (2012) find that an increase in the Gini coefficient of 1 percent increases by 6 percent the risk that growth will end next year. However, Dominicis et al. (2008) perform a meta-analysis of 407 linear regressions and find that in two thirds, the relationship between inequality and growth is negative, while it is positive in the rest. In addition, Ostry et al. (2014) do not find direct effects on the growth rate from the redistribution of income toward the lowest deciles (i.e., the reduction of inequality). According to the authors, redistributive policies may have allocative efficiency costs, but their net benefit consists of counteracting some of the strongest negative effects of inequality on growth.

In addition to the relationship between inequality and investment, there is another transmission channel studied between inequality and growth, which is the impact of the former on consumption and aggregate saving. In this way, Crespo Cuaresma et al. (2016) revalidate with modern econometric methods and broader databases the results of Blinder (1975), which shows that increases in inequality—measured by the Gini coefficient—are not significantly correlated with changes in aggregate consumption. They suggest that this lack of correlation is evidence against the inequality-consumption mechanism usually assumed in post-Keynesian models. On the other hand, Schmidt-Hebbel and Serven (2000) do not find support for the idea of a systematic effect of inequality on aggregate saving, which for the authors is consistent with the existing ambiguity in economic theory.

This point is central for post-Keynesian literature, where the key variable is the income distribution and its impact on aggregate demand and its components, conditioned to the current accumulation regime in a particular country and a given historical period (for example, those that have wages-led regimes or those that have profit-led regimes). Stockhammer, Onaran, and Ederer (2009) and Onaran and Obst (2016) present rich evidence showing that the relationship between income distribution and aggregate demand is relatively heterogeneous. An alternative in this vein is to determine if countries have growth driven by debt—"finance-led growth" (Stockhammer, 2012). This variant is coherent with the post-Keynesian tradition that has always given great importance to the interaction between macroeconomics and finance and to debt cycles as a cause of economic fluctuations and crises (Minsky, 1995; Blecker, 2016).

In recent post-Keynesian literature, Stockhammer and Wildauer (2015) extend the model of Bhaduri and Marglin (1990) to include consumer cascades (the "Veblen effect") and the effects of indebtedness and wealth. This model is adequate to explain whether the regime of

accumulation of the economy is driven by wages or profits. Within this framework they present a regression limited to twelve European Union countries for aggregate investment in the period 1980-2011. According to their results, they do not find a direct negative relationship between the wage share and investment, while the effect of the share of “top 1 percent income” is not statistically significant.

In search of nonlinear behaviors, Bofinger and Scheuermeyer (2016) analyze a limited panel of twenty-nine advanced countries and find a non-monotonic link between inequality and household savings. They find that increased inequality is related to greater savings at low levels of initial inequality, but at high levels of initial inequality the opposite occurs.

Some recent works have addressed the relationship between inequality and investment as a "by-product" issue of the study of the connection between the distribution of income and aggregate demand. For example, Brueckener and Lederman (2015) analyze the effects of inequality on aggregate supply, seeking to establish whether there is a difference in the role of inequality between poor and rich countries, depending on the conditions of access to credit for each type of country. They rely on the theoretical development with imperfections in the credit market of Galor and Zeira (1993), which predicts that an increase in inequality is negative for GDP per capita in rich countries but positive in poor countries. Additionally, they investigate in a static panel the relationship between inequality and investment and between the former and investment in human capital, finding a positive connection between Gini and investment that is conditioned by the level of GDP per capita of 1970.

Most of the empirical literature focuses on linear-type estimates. In this regard, Banerjee and Duflo (2003) criticize the results of Barro (2000) and Forbes (2000) arguing that they are a "statistical artifact" because they impose linear constraints that are inconsistent with the predictions of the theory and the qualitative evidence regarding how inequality operates. Other recent articles that explore nonlinearities are Brueckener and Lederman (2017) and Banerjee and Duflo (2003). The latter find an "inverted U" relationship by which reductions or increases in inequality are accompanied by decreases in growth.

There is a long list of literature that analyzes the traditional determinants of investment resorting to different theories but without taking into account variables related to inequality. This list is analyzed in more detail below, in the specific discussion of the variables of the empirical model. However, it is worth highlighting some references due to their simultaneous academic and economic policy relevance.

In the 2005 WEO (IMF, 2005), the IMF presents an analysis of the current account, savings and investment in the context of global imbalances that were very intense at that time. The regressions mark a mainstream standard for the design of economic policies by the technical staff of international and national governmental organizations. These estimates do not take into account a possible role for inequality. Along the same lines, in recent institutional work the IMF presents the methodology of the External Balance Assessment (EBA) "version 2.0" (see Phillips et al., 2016). Although the main regression refers to the current account, the authors perform additional regressions for savings and investment in order to determine through which channel the determinants work. In the broad set of variables that are tested, they have not incorporated variables related to inequality.

Other studies on aggregate investment such as Pelgrin et al. (2002) add financial factors to the neoclassical model, but do not take into account the role of the income distribution over the variables of interest. Relatedly, the objective of Serven (2003) is to show the impact of uncertainty on the real exchange rate. Moreover, other recent works that study the factors influencing investment levels ignore the role of inequality. These include Combey (2016), which analyzes the determinants of investment for a panel of countries in West Africa; and Cavallo and Pedemonte (2015), who study the link between saving and investment in the context of the paradox of Feldstein and Horioka in Latin America.

In summary, the empirical evidence reviewed here shows that there are few works that: i) join inequality with investment measured as fixed capital; ii) control by a wide set of variables

contrasting different theoretical approaches; iii) have a broad sample of countries that includes advanced and developing countries; and iv) that test for a possible nonlinear relationship.

4. Empirical model.

The empirical model of this paper is nurtured by three sources. First, it takes into account the traditional literature on investment focused on the role of the cost of capital and growth, mostly in closed economies. Second, it incorporates all the experience of the last twenty years in the analysis of the relationship between inequality and growth. Finally, controlling for additional constraints imposed by the financial integration given its importance since the 1990s, it takes advantage of the literature that analyzes investment together with savings as parts of the current account.

The main variables that are considered in the analysis are described below (sources and technical description in Appendix 1). To represent the inequality that is the main interest of this work, the Gini coefficient is used. Given that the data of this indicator that arise from the various national statistical sources are not directly comparable, we use "The Standardized World Income Inequality Database" (Solt, 2016), which is the result of important homogenization and standardization work.

For the rest of the covariates, a multidimensional approach has been followed in order to consider the three different sources from the literature. The empirical approach contemplated in this paper is broad and tries to control for the main variables used in neoclassical, post-Keynesian and also "policy-oriented" works such as those made by international organizations (the IMF, World Bank, UNCTAD, and the OECD). Specifically, this model is an improvement of the recent literature that decomposes the dynamics of the current account of the balance of payments into the behavior of saving and investment (Chinn and Prasad, 2003; Chinn et al. 2012; Phillips et al., 2016; IMF, 2005).

There is consensus among various theoretical approaches to associating investment with the domestic product (or national income), from the traditional flexible accelerator theory (Jorgenson, 1963), to post-Keynesian approaches such as Stokhammer and Wildauer (2015) and Blecker (2015). In this paper, the GDP is used in two complementary ways. On the one hand, the output gap is employed to capture the cyclical effects of the variable and, on the other, it is complemented by long-term growth expectations as a representation of the expected trend.

The expected sign in the literature for the output gap is positive (Blanchard and Fischer, 1989). For example, Phillips et al. (2016) find a positive and significant sign. Given that it is possible that some movements in the output gap are generated from changes in other variables included in the regression, such as the interest rate or fiscal policy, the coefficients of these variables in this regression are probably measuring the effect of these for a certain output gap.

Complementarity to the business cycle is the scope of considering the long-term trend of the output under the premise that expectations of a higher growth will encourage greater investment. A forward-looking measure is used based on the estimated future output, which is obtained from a database generated regularly for the IMF's WEO, which presents the expected five-year growth for every country. This variable is used in the "External Balance Assessment" (EBA) conducted by the IMF (Phillips et al., 2016); the expected sign is positive.

In a sample as wide and heterogeneous as the one used in this paper, the level of relative development of each country is a key structural variable to evaluate the dynamics of the investment. For this, GDP per capita (measured in PPP) with respect to the three largest advanced economies (the US, Japan, and Germany) is used. Except for a few exceptions associated with large stocks of natural wealth, the most developed countries have the highest GDP per capita. In general, this indicator has a very high correlation with other alternative

indicators of development such as the UN HDI, and it is also interpreted in the empirical literature as an approximation of the relative productivity of the economy. Traditional theory indicates that capital should go to investments in countries with low capital stock and abundant labor, i.e. from high-productivity economies to low-productivity economies. However, the so-called paradox of Lucas (Lucas, 1990) pointed to the fact that capital did not flow from the advanced countries to those in the process of development. Therefore, although the expected sign is controversial in theory, empirical evidence tends to find that it is positive. That is, a higher per capita product (higher productivity) or a higher level of development tends to stimulate investment.

In traditional investment models, the cost of capital is a central variable (Romer, 1986; Blanchard and Fischer, 1989). For example, according to FMI (2005), an increase in the cost of capital of 1 percent leads to a fall in the investment/GDP ratio of 0.4 percent. In work for the OECD, Pelgrin et al. (2002) find analogous results. In this regard, we use the real interest rate represented by the opportunity cost of companies to finance themselves in the domestic market, and it also approximates the credit conditions imposed by monetary policy (IMF, 2005).

It has been highlighted in recent decades that, with imperfect financial markets, the cost of credit is not the only variable that can be used to measure the possibility of financing investment (see Stiglitz, 1992, for this differentiation between the price and the quantity channels in the credit market). Therefore, in order to fully reflect the Keynesian concept of "credit status," in addition to the cost of credit, among the variables used to measure the relationship between investment and financing, the literature has used the level of credit in terms of GDP as a proxy of financial development and available credit. When firms must resort to external financing, they have as their main reference the availability of bank credit in the economy, especially if they are small or medium, so that they cannot issue their own debt instruments in the market or cannot access the external credit markets. Therefore, a positive sign is expected for this variable. Serven (2003) and Chinn et al. (2012) find that this variable is positively related to savings and investment. Pelgrin et al. (2002) find a positive and strong effect of the volume of credit on investment, but at the same time they find that, since the 1990s, the size of the coefficient has decreased, both as a result of greater openness of economies to external capital, and of the expansion of the availability of extra financial instruments especially for companies in the OECD countries. On the contrary, in IMF (2005) the result is negative for the complete sample. Moreover, Stockhammer and Wildauer (2015), in a panel of advanced countries, use disaggregated credit data for households and find a negative sign for investment in advanced countries, while the share price has a positive sign.

Regarding the impact of macroeconomic policies, in addition to measuring the corresponding to the monetary policy approximated by the real interest rate, the effect of fiscal policy is an important complement. The expected sign for this determinant is ambiguous because, given a certain result of the fiscal balance, it is relevant how the surplus is obtained and what type of expenditure is made. A deficit caused mainly by large investments in infrastructure, instead of current expenditures, could attract complementary private investments additionally to being accounted for in the aggregate investment itself. On the other hand, a surplus can result from a reduction in public expenditures that crowds in higher private expenditures and private debt capacity, or by taxes that are higher than the expense that generate the opposite effect. Finally, from an intertemporal view, the greater the current fiscal surplus, the lower the probability of tax surprises (new taxes) in the medium term over the invested capital motivated by a fiscal adjustment. In the standard empirical literature, a positive impact of the fiscal balance has been found, both for saving and for investment (Chinn et al., 2012; Phillips et al., 2016), questioning in the first case the Ricardian equivalence. In FMI (2005) this variable is not used as a regressor of the investment being reserved exclusively for saving.

Inflation is another of the macroeconomic variables regularly associated with investment. Higher inflation rates are an indicator of nominal uncertainty and of potential macroeconomic

imbalances that can lead to abrupt changes in relative prices or taxes, modifying the original conditions of the investment. Therefore, the expected sign is negative.

Another usual variable in the models that analyze the current account based on the savings and investment scheme is the terms of trade that represent the relationship between export prices and import prices. The IMF (2005) uses this variable only to analyze savings. In this paper, it will be used for investment considering the large number of developing countries that have very dichotomic and unbalanced or heterogeneous trade structures through which they export raw materials or labor-intensive manufactures, and also import capital goods or manufactures of medium and high technological content (inter-industry trade). Therefore, in these economies, the expected changes in the terms of trade are greater than in advanced countries, with greater participation of intra-industry trade in total trade, which is why the terms of trade tend to vary much less.

In addition, we include the real effective exchange rate (REER) misalignment as an additional control variable. The misalignment is calculated as the difference between the observed value of RERR and the trend that emerges from the HP filter (Carrera et al., 2016). This coefficient involves testing whether real exchange rate misalignment impact investment. For example, an increase (appreciation) in the REER over its equilibrium, made exports less competitive but imports of capital goods for non-tradable sectors cheaper. Guzmán, Ocampo and Stiglitz (2018) show that markets can generate a suboptimal amount of investments in certain sectors, so a competitive real exchange rate is key to faster growth. Berg and Ostry (2011) find that reducing overvaluation is associated with longer growth periods. Complementarily, Serven (2003) finds a negative effect of the volatility of the real exchange rate on investment.

Therefore, the expected sign of REER misalignment on investment is ambiguous, so far as it depends on the predominance of the effect on tradable and non-production goods vis-a-vis the effect on the cost of imported and local capital goods.

It is worth noting that there could be a potential complementarity between the terms of trade and the REER's misalignment, since the former are an important determinant of equilibrium REER, especially in developing countries. In these economies, for example, an improvement in the terms of trade tends to generate appreciation pressures on the REER, but the final result and how these pressures are processed as a misalignment in the short and medium term will depend on the current exchange rate regime.

The proposed broader empirical model seeks to additionally capture three key structural characteristics of most economies since the 1990s. Two of them represent the degree of the country's international insertion and aim to measure the effective impact on the investment of the policies of commercial opening and external financial liberalization.

Trade openness, represented by the sum of exports and imports over GDP, is the usual variable in this literature to represent the degree of trade liberalization (Phillips et al., 2016; Chinn et al. 2012). Mainstream literature expects that increases in market size, greater competition and learning will enhance investment and growth (Berg and Ostry, 2011).

The financial opening is represented by the Chinn and Ito Index (2006), which is also the most usual way in the empirical literature to measure the quantitative and regulatory changes that make the opening of the capital account. This is a *de jure* index that functions as a synthetic indicator of the opening of the capital account. It is based on a binary dummy that codifies the restrictions on inter-frontier financial transactions reported in the "IMF's Annual Report on Exchange Arrangements and Exchange Restrictions". From a traditional perspective, the expected results would be positive due to greater access to sources of external savings to reduce the investment dependence of national savings, while the effect would be particularly intense and lasting in the case of foreign direct investment (Berg and Ostry, 2011).

In addition to measuring the degree of commercial and financial interaction, it is important to take into account the international investment position of the countries, controlling for the stock of net assets with respect to the rest of the world. To some extent the net external assets (NFA) of a country are the cumulative result of the interaction of net commercial, portfolio, and direct investment flows (Lane and Milesi-Ferretti, 2007). For globally integrated economies it is important to explore if the degree of net external wealth of a country can influence the investment decisions of local and external agents. Within the literature that analyzes the current account based on the saving and investment scheme, it is usual to find a more positive and strong effect of the NFA on savings than on investment (Chinn et al., 2011; Phillips et al., 2016). In Carrera et al (2017), the NFA has a positive effect on investment that is concentrated in advanced countries. This is striking because direct evidence (without controlling for other variables) would show that many countries in Asia have had current account surpluses that increased their NFA (positive) and at the same time aggregate investment has grown. Simultaneously, some advanced countries such as Germany or Japan, with strong increases in their NFA based on recurrent current account surplus, have seen their aggregate investment decline. According to Gourinchas and Jeanne (2009) the patterns of capital flows to developing countries do not match with the predictions of the standard neoclassical theory. They consider that a more comprehensive approach is necessary, where financial frictions affect decisions on saving and investment. As we can see there is no a clear theoretical indication of the expected sing.

Based on what has been discussed so far, the formal analysis focuses on the relationship between inequality and investment in fixed capital (GFCF, hereafter) exploiting both the cross-sectional and the temporal dimensions of the data. The panel used covers 26 years from 1990 to 2015 and 95 economies, both advanced and developing. The base regression specification is as follows:

$$y_{i,t} = \gamma y_{i,t-1} + \beta_1 gini_{i,t} + \beta_2 gini^2{}_{i,t} + x'_{i,t}\delta + \eta_i + \mu_t + \varepsilon_{it} \qquad (1)$$

where $y_{i,t}$ is the gross fixed capital formation (% GDP) in country i in year t; and $x_{i,t}$ is a vector of control variables among which are included the determinants of the investment usually used in the literature; η_i is a fixed effect per country; μ_t is a time fixed effect (to test for common shocks); and $\varepsilon_{i,t}$ the unobservable error term. Among the regressors, a focus is made on an inequality indicator, $gini_{i,t}$ -the Gini coefficient-, which is included in a linear and quadratic way to allow a non-linear relationship. The control variables included in $x_{i,t}$ are: the output gap; the five-years output growth forecast; the relative product; the fiscal balance (% GDP); trade openness (sum of exports and imports as a percentage of GDP); a capital account openness index (Chinn and Ito, 2006); the credit to the private sector (% GDP); the real interest rate; the inflation rate (CPI index); the net foreign assets position (% GDP); the terms of trade; and the misalignment of the multilateral real exchange rate.

5. Econometric methodology.

The econometric analysis of a relationship like the one studied in this paper faces several sources of potential biases that can result in biased and inconsistent estimates. In particular, simultaneous solutions are required of the problems imposed by the following: the strong inertia that characterizes the GFCF; the moderate variation over time of both the dependent variable and of the key explanatory variable (Gini); and the potentially endogenous regressors. In this regard, a variety of estimation methodologies are considered to deal with such problems and ensure robust results. Each of these estimators implies a trade-off between different types of biases.[7]

[7] See, Bastourre, Carrera and Ibarlucía (2009) for an exhaustive discussion of this different estimators.

The estimation of a static model, either pooled OLS (POLS) or fixed effects (FE), would lead to biased and inconsistent estimates as a result of the omission of the dynamic component; that is, the inertia of the explained variable. In particular, this is more problematic when the dependent variable shows high persistence, as is the case of the GFCF. Within the dynamic specifications one possibility is a PDOLS estimate ignoring the individual heterogeneity. However, the autoregressive coefficient will be biased due to the possible correlation between the individual fixed effects in the error term and the regressors, affecting the consistency of the estimates (Hsiao, 1986). An alternative is a dynamic fixed-effect model (D-LSDV), but the autoregressive coefficient will be downward biased since the transformation of the lagged dependent variable is correlated with the transformed error term, as documented by Nikell (1981) and Kiviet (1995). This is known as endogeneity or dynamic panel bias, and may even be exacerbated by the potential correlation between other regressors and the error term, affecting the consistency of both D-LSDV and PDOLS. The fact that the previous estimators are biased in opposite directions provides a useful hint about the range in which the consistent estimate is expected to be.

On the other hand, although FE allows arbitrary correlation between the unobservable individual factors and the regressors in any period, due to this, any explanatory variable that is constant in time for all is removed by the "within" transformation. Therefore, if the key explanatory variable shows moderate variation over time, as is likely the case to some extent with the Gini coefficient (the variable of interest to this work), it is not advisable to use FE as the only reference (Wooldridge, 2012).[8]

The third source of bias is the measurement errors in the independent variables that are very likely in cross-sectional data. In this regard, PDOLS reduces the heterogeneity bias because, ceteris paribus, measurement errors tend to reduce the correlation between regressors and the fixed effects per country. Meanwhile, D-LSDV tends to exacerbate the problem of measurement errors relative to PDOLS, and it is even worse when explanatory variables are more persistent in time than measurement errors (Hauk and Wacziarg, 2009).

An alternative is the generalized method of moments (GMM) estimators (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998). The s- called system GMM (SGMM) has gained popularity and is widely used in a variety of applied economic research (Roodman, 2009).[9] The GMM estimator treats various biases such as omitted variables, endogeneity (of other variables apart from y_{t-1}) and measurement errors (so far as the instruments are not correlated with measurement errors, for example, if they are white noise in the classical sense), but may be subject to a potential problem of weak instruments (Roodman, 2009; Bazzi and Clemens, 2009).

Finally, an additional possibility to treat the bias induced by the inclusion of y_{t-1} is to correct the dynamic fixed-effect estimator. Kiviet (1995) stresses the contrast between the consistent GMM estimator and the biased but more efficient D-LSDV. The bias correction proposed (D-LSDVC) provides an unbiased and efficient model, but unfortunately it does not deal with the potential problem of endogenous regressors.

In short, it is difficult to know a priori which estimator results in a lower total bias in the presence of several sources of potential biases. However, based on the discussion above, we consider the D-LSDVC and SGMM estimators to be the most appropriate tools to deal with

[8] From the point of view of this work it is understood that the inclusion of fixed effects would diminish the economic significance of part of the analysis and, in fact, this is the reason why most of the previous studies (Chinn and Prasad, 2003; and Chinn, 2007; Chinn et al, 2012; Phillips et al., 2016) do not include them in their main regressions.

[9] The literature on GMM estimators is huge and is constantly expanding. A useful recent compilation and additional discussions can be found in Green (2000, Chapter 11) and Wooldridge (2002, Chapters 8 and 18).

these problems. While both provide consistent and unbiased estimates, the first is relatively more efficient but unfortunately it does not address the potential endogeneity problems.

6. Results.

6.1 General results of the empirical model.

Table 1 presents the results for the broad empirical model that incorporates the structural variables that define a country's international insertion. A more reduced model in which the main results remain unchanged is available upon request.

Five econometric alternatives are presented, which are discussed in a sequential way in order to illustrate the benefits of the proposed empirical strategy. Columns 1 and 2 of Table 1 show pooled OLS (POLS) and FE estimates, respectively, while columns 3 and 4 are the dynamic specifications of the former (PDOLS and D-LSDV, respectively). These two methodologies produce autoregressive coefficients biased in opposite directions. In any case, they are useful for two reasons. First, they illustrate the importance of including the dynamics in terms of signs, magnitude, and levels of significance of the right-hand variables. It is clear from both columns (3 and 4) that the addition of the lagged dependent variable captures much of the effect of other persistent variables, such as the output gap in the PDOLS and D-LSDV models.

Therefore, the first relevant result is that ignoring the inertia in the GFCF would lead to biased and inconsistent estimates, especially in cases like this, where the autoregressive parameter shows a high persistence. As explained in the methodological section, a consistent estimate of this coefficient should be in the range determined by the PDOLS and D-LSDV estimates. This is the case of the dynamic fixed-effect model (D-LSDVC) presented in column 5.

In column 6 the results corresponding to the SGMM are shown.[10] [11] As can be seen, the autoregressive coefficient of the lagged dependent variable increased moderately and is also placed among those of the PDOLS and D-LSDV models. The Hansen and second-order autocorrelation tests do not reject the validity of the set of instruments. [12]

[10] The two-step variant was made incorporating the correction by finite sample of Windmeijer (2005), and the transformation of orthogonal deviations that, instead of subtracting the previous observation of the contemporary one, subtract the average of all the available future observations of the variable, so that it minimizes the loss of data. Since lagged observations do not enter into the formula, they are valid as instruments (Roodman, 2009).

[11] In the GMM system estimates, all the variables, except the terms of trade, are considered as endogenous, so they are instrumented with the second lag of the instrument in levels for the transformed equation, and from lag 1 to 4 for the differences in the equation in levels.

[12] In GMM models the number of instruments grows exponentially when T increases. This implies that in a typical macro panel (larger T and smaller N than in a micro panel) it is common for the second-step variance-covariance matrix to become singular if instruments are not restricted and it weakens the power of the Hansen's test. For this reason, a collapsed instrument matrix is used and the instruments are restricted.

Table 1. Regression. Full model. [13]

	(1) OLS GFCF	(2) LSDV GFCF	(3) DOLS GFCF	(4) DLSDV GFCF	(5) KIV GFCF	(6) SGMM GFCF
Gini	-0.998***	-2.844***	-0.185**	-0.647	-0.626***	-0.705*
	(0.168)	(0.713)	(0.0780)	(0.423)	(0.190)	(0.360)
Gini squared	1.103***	3.410***	0.202**	0.753*	0.746***	0.869*
	(0.207)	(0.772)	(0.0952)	(0.455)	(0.202)	(0.478)
Gross Fixed Capital Formation (-1)			0.877***	0.740***	0.741***	0.841***
			(0.0212)	(0.0385)	(0.0351)	(0.0414)
Output Gap	1.967***	1.329***	0.299	0.626*	0.621***	-0.0437
	(0.631)	(0.499)	(0.299)	(0.327)	(0.129)	(0.637)
Growth Forecast	1.681***	0.879***	0.357***	0.522***	0.523***	0.699***
	(0.188)	(0.201)	(0.101)	(0.126)	(0.0487)	(0.211)
Relative GDP	0.144***	0.635***	0.00594	-0.00106	0.0117	0.0291
	(0.0291)	(0.142)	(0.0139)	(0.0846)	(0.0127)	(0.0578)
Fiscal Balance	0.00308	0.0225	0.0146	0.0293	0.0299***	0.150**
	(0.0421)	(0.0513)	(0.0182)	(0.0325)	(0.00890)	(0.0675)
Credit to Private Sector	0.0140***	0.0230*	-0.000794	0.00375	0.00360	0.00297
	(0.00484)	(0.0122)	(0.00253)	(0.00784)	(0.00222)	(0.00600)
Inflation Rate	-0.0408***	-0.0132	-0.0304***	-0.0341***	-0.0346***	-0.0419***
	(0.0154)	(0.0103)	(0.0109)	(0.0101)	(0.00653)	(0.0112)
Real Interest Rate	-0.0424**	-0.0175	-0.0152*	-0.00686	-0.00749	0.0199
	(0.0170)	(0.0147)	(0.00860)	(0.0124)	(0.0132)	(0.0230)
Trade Openness	0.00298	0.0269**	-0.00183	0.0236***	0.0256***	-0.00903
	(0.00349)	(0.0129)	(0.00164)	(0.00727)	(0.00847)	(0.0112)
Capital Account Openness	-0.00175	0.00471***	-6.46e-05	0.00146	0.00138	-0.000733
	(0.00134)	(0.00166)	(0.000583)	(0.00108)	(0.00175)	(0.00189)
Net Foreign Assets Position	0.0415***	0.0104	0.0117**	0.0237**	0.0251***	0.0313**
	(0.00901)	(0.0138)	(0.00489)	(0.00933)	(0.000506)	(0.0157)
Terms of Trade	0.0150***	0.0342***	-0.00244	0.00695	0.00663*	0.00158
	(0.00561)	(0.00696)	(0.00271)	(0.00461)	(0.00359)	(0.00493)
REER's Misalignment	0.0532**	0.0352**	0.00924	0.0167	0.0177	-0.0318
	(0.0241)	(0.0151)	(0.0119)	(0.0111)	(0.0238)	(0.0255)
Constant	0.172***	0.0249	0.0630***	0.122		0.101
	(0.0530)	(0.170)	(0.0232)	(0.108)		(0.0778)
Observations	1,330	1,330	1,311	1,311	1,311	1,311
Number of id	95	95	95	95	95	95
R-squared	0.341	0.748	0.868	0.887		
Extreme Point (SLM Test)	0.452	0.417	0.458	0.430	0.420	0.395
p-value (SLM Test)	0.000	0.000	0.064	0.079	0.001	0.065
Hansen p-value	.	.	.	.	.	0.330
AR 2 p-value	.	.	.	.	.	0.100
Number of instruments	.	.	.	.	.	92

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Time period: 1990-2015. All models includes time effects.

The estimates corresponding to the linear and quadratic terms of Gini present a negative and positive sign respectively, being significant in nine of ten cases. This is what would define as plausible the existence of a "U" shape in the connection between inequality and investment, confirming the intuition that emerges from the two figures in Appendix 2. This implies that the impact of inequality on investment is conditional on the relative level of inequality. To confirm the statistical significance of this nonlinear relationship, the results of the Sasabuchi-Lind-

[13] Regressions based on a short model it is available upon request. The main results remain unchanged.

Mehlum test (SLM-Test; Lind and Mehlum, 2010) are presented. More specific implications of this result will be discussed in detail below.

Dynamic models (3-6) show that the lagged dependent variable is significant and positive, with a bounded range for coefficients ranging from 0.740 to 0.841, which confirms that the GFCF variable has an important inertia. We observe that the control variables that are usual in the literature mostly exhibit the expected signs. As expected, the size of the coefficients in the dynamic models tends to be smaller than in the static ones, due to the inclusion of the lagged dependent variable.

For the output gap, a positive coefficient is found in four models. This is coincident with Phillips et al. (2016), Pelgrin et al. (2002) and FMI (2005), which show that investment is highly procyclical.

The sign of the five-year GDP forecast coefficient is highly significant in all models. This is in line with Phillips et al. (2016) and it is consistent with the idea that this variable implicitly represents the expected growth and determines demand expectations for investors.

For relative GDP. the sign is positive and is significant only in static models. This is to the contrary of Chinn et al. (2012), in which the sign is negative.

The impact of financial conditions or "credit status" (Keynes, 1936) on investment is represented by two key variables: the volume of private credit in terms of GDP, and the real interest rate as an indicator of the financial cost. Both are significant only in a limited number of models.

Regarding the real interest rate, the sign is negative, but it is significant only in two models. Although the expected sign is negative in terms of funding costs, for developing countries some authors such as McKinnon (1973) point out that high real rates are positively associated with investment because they generate the necessary savings in contexts of restrictions on access to external funds. This result, where the cost of capital is not significant or significant only in particular cases, has been recurrent in the empirical literature (Shapiro, 1986; Pelgrin et al. 2002; FMI, 2005; Combey, 2016). On the other hand, for Serven (2003) the real interest rate has a negative and significant sign in all the models, as Stockhammer and Wildauer (2015) similarly found for sixteen countries of the OECD.

In relation to credit, the positive sign is in line with results found in other works, such as Chinn et al. (2012), Serven (2003) and Pelgrin et al. (2002). This finding is not universal; in IMF (2005) the result is negative for the complete sample. Moreover, Stockhammer and Wildauer (2015) use disaggregated credit data for households and find a negative sign regarding investment in advanced countries, while the share price has a positive sign. It is possible that the discrepancies between the results in this paper and those of the latter one are a result of the diversity and amplitude of our sample.

The fiscal policy represented by the fiscal balance is positive in all models, but significant only in two of the dynamic models (D-LSDVC and SGMM). Therefore, an improvement in the fiscal balance stimulates investment in fixed capital. Phillips et al. (2016) and Chinn et al. (2012) also find a positive and significant effect. The low significance of fiscal policy with respect to investment contrasts sharply with its importance in determining aggregate savings (Carrera et al., 2017; Bofinger and Scheuermeyer, 2016).

Inflation is negative for investment being a representation of the effect of the nominal volatility on the economy. The coefficient is negative and significant in five of the six models, being very stable between the different specifications (between -0.030 and -0.040). Therefore, higher inflation is associated with lower investment rates. Conversely, Combey (2016) shows that inflation is not a significant determinant for investment in a sample of West African countries.

The terms of trade coefficient is positive and significant in three models, indicating that a relative improvement in export prices or, eventually, a substantial drop in the prices of imported

capital goods stimulates investment. These results differ from those of Chinn et al. (2012) and those of Combey (2016), which do not find a significant impact of this variable.

Finally, the positive misalignment of the REER with respect to its long-term trend (an appreciation) has a positive and significant effect on investment in static models. Looking at the misalignment of the real exchange rate together with the terms of trade, it is possible to establish a division of roles with respect to investment. On the one hand, an improvement in export prices with respect to imports could improve investment through the export channel, and simultaneously, a currency appreciation would boost investment by making imported capital goods more accessible.[14] In a sample with a significant number of countries specialized in the exportation of raw materials or labor-intensive industrial manufactures, this result seems to be more plausible than in samples based exclusively on advanced countries. Combey (2016) finds no impact of the real exchange rate on investment, and Serven (2003) finds that the volatility of the real exchange rate is negative for investment.

Within the group of more structural variables that represents the country's international insertion, the model contains two that represent the degree of external openness of the economy through the commercial channel and the financial channel, respectively. It is observed that the commercial openness is associated with greater investment in three of the models, their coefficients being very stable in both static and dynamic models (between 0.0236 and 0.0269). These results coincide with Chinn et al. (2012), but not with Combey (2016), which does not find an effect of commercial openness on investment.

The degree of international financial integration measured by de jure openness of the capital account through the Chinn and Ito index does not appear with stable signs and is positive and significant only for the static model with fixed effects. Carrera et al. (2017) also find that it is not significant, whereas Chinn et al. (2012) find a negative sign for this variable.

The third external factor of a structural nature is the situation of the country as an international debtor or creditor. The net position of external assets (NFA) has a positive and robust effect with coefficients that vary between 0.0104 and 0.0313. Therefore, countries with net creditor positions (which generate positive current income flows) present, ceteris paribus, higher investment than net debtors. In Chinn et al. (2012) the estimated coefficient is negative and significant at 10 percent only for the full sample.

6.2 Non-linear scheme and interactions.

In the literature, there have been authors—from the "inverted U" of Kuznets onward—who have investigated nonlinear phenomena in relation to inequality. In our case, the estimated linear and quadratic coefficients of the Gini are significant and show a U-shaped relationship as derived from the SLM test. Based on equation (1), the expression for said nonlinear link is as follows in (2) where *c* is a constant that includes the effects of the other explanatory variables at a given point. The expected change in the investment in the face of a variation of the inequality can be obtained by totally differentiating (2) with respect to Gini with everything else constant. Thus, the partial derivative (3) shows the marginal effect of the Gini coefficient on the gross fixed capital formation (GFCF), keeping the rest of the variables constant in their average levels.

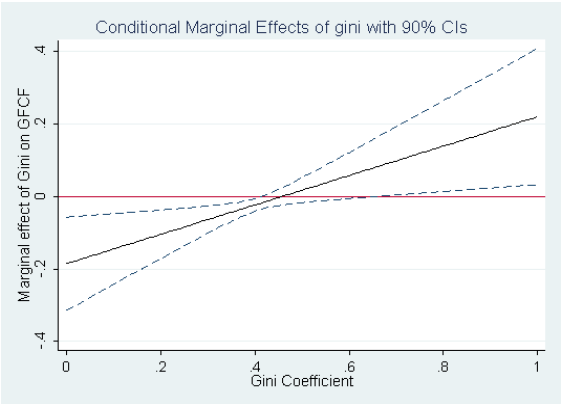
$$y_{i,t} = \beta_1 gini_{i,t} + \beta_2 gini^2{}_{i,t} + c \qquad (2)$$

$$\frac{\partial \mathrm{E}[y|x]}{\partial gini_{i,t}} = \hat{\beta}_1 + 2\,\hat{\beta}_2\, gini \qquad (3)$$

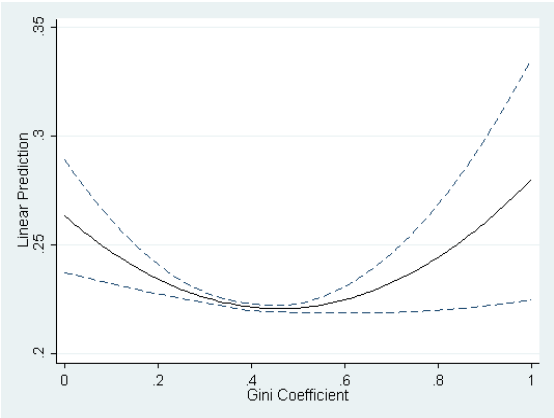
[14] It is common to find in studies on the real equilibrium exchange rate that an improvement in the terms of trade can generate appreciatory impulses on the real exchange rate of equilibrium. This phenomenon is seen especially in countries defined as exporters of raw materials where prices impulse investment despite REER appreciation.

Based on the results of the model (3), in the left panel of Figure 1 the marginal effect of the Gini coefficient on the GFCF for each Gini value is shown, where a relation with "U-shaped" is deduced whose "turning point" is found for levels of Gini close to 0.45. Considering that a higher Gini indicates greater inequality, this suggests that, at high levels of inequality, the marginal effect of an increase in inequality on investment is positive, all else being equal. However, as lower levels of Gini are considered, the positive marginal impact decreases in absolute value, and becomes negative (with increasing absolute value) at medium and low levels of inequality. In line with the results of the SLM test, the confidence interval indicates a statistically significant negative effect for Gini values below 0.4, and a positive and significant effect for Gini values greater than 0.6. Meanwhile, the right panel of Figure 1 shows the linear prediction of the relationship between the Gini coefficient and the GFCF. Intuitively, this Figure indicates the predicted value of the GFCF for different Gini levels, keeping the rest of the variables constant in their average. In other words, in relatively more unequal economies, an increase (fall) in inequality augments (decreases) the GFCF, but this effect decreases in absolute value for middle and lower levels of initial inequality, so that an increase (fall) of the inequality decreases (augments) the GFCF only in economies with medium and low levels of inequality (punctually less than 0.45).

Figure 1. Panel A. Conditional Marg. Effect of Gini (90 percent CIs)



Panel B. Adjusted Prediction of GFCF (90 percent CIs)



It is worth considering whether the U-shaped relationship between investment and inequality, besides being a cross-country phenomenon, could be relevant as a representation of specific countries' dynamics. For these purposes, Appendix 3 shows illustrative cases of different possible behaviors. The following analysis focuses on those countries that showed a single trend over the period considered; however, there are some economies for which some stages associated with reversals can be identified. For example, in the case of Germany increase in inequality is observed with a simultaneous reduction in investment. This is a pattern

common to other advanced countries like Japan and Korea. Conversely, China evidences the opposite dynamics (as do India, Costa Rica and Romania), with an increase in inequality accompanied by an increase in investment. Senegal represents another dynamic, which goes from the right to the left: there was an improvement in inequality and an increase in investments. In the opposite direction, Iran shows a path that evidences a reduction in inequality associated with a reduction in investment (as does El Salvador). Finally, Brazil and Tanzania show two clear “U shape” paths. In Brazil, this path goes from right to left, which implies a reduction in inequality that corresponds first to lower and then to higher levels of investment (see, for example, also Chile, Peru), while Tanzania's evidence points the opposite way.

6.3 Robustness tests.

6.3.1 Multiple imputation estimates.

In this section, it is tested whether the uncertainty associated with the data in the SWIID database (Solt, 2016) affects the results. Therefore, a multiple imputation technique is used to account for the uncertainty of the data. Essentially, repeated regressions are run for the 100 Gini imputations and then the resulting estimates are pooled. Thus, the estimated coefficients and the standard errors are adjusted for the variability between the imputations, whereas regressions on averaged data treat the Gini from the SWIID as an error-free variable. It is worth mentioning that, due to the specificities of the Stata routine, these estimations can only be obtained for the POLS and FE models, both static and dynamic.

The results are shown in Table 2. In general, the enhanced statistical accuracy stemming from multiple imputation estimates hardly affects the general results. Just as in in the baseline regressions, there is a nonlinear relationship between inequality and investment. The effect of inequality remains highly significant and the locations of the turning points almost unchanged.

Table 2. Multiple Imputation Estimates.

	(1) OLS GFCF	(2) LSDV GFCF	(3) OLS GFCF	(4) LSDV GFCF	(5) OLS GFCF	(6) LSDV GFCF	(7) OLS GFCF	(8) LSDV GFCF
Gini	-0.826***	-0.865***	-1.322***	-1.994***	-0.126**	-0.153**	-0.253	-0.446
	(0.135)	(0.148)	(0.439)	(0.603)	(0.0614)	(0.0679)	(0.268)	(0.377)
Gini squared	0.942***	0.946***	1.393***	2.242***	0.141*	0.168**	0.235	0.479
	(0.172)	(0.183)	(0.492)	(0.661)	(0.0776)	(0.0842)	(0.301)	(0.415)
Gross Fixed Capital Formation (-1)					0.892***	0.890***	0.753***	0.742***
					(0.0157)	(0.0169)	(0.0291)	(0.0334)
Output Gap	1.840***	1.939***	1.757***	1.728***	0.444**	0.508**	0.617***	0.694***
	(0.449)	(0.506)	(0.355)	(0.395)	(0.214)	(0.232)	(0.226)	(0.254)
Growth Forecast	1.785***	1.767***	0.959***	1.018***	0.312***	0.345***	0.421***	0.504***
	(0.169)	(0.182)	(0.160)	(0.183)	(0.0787)	(0.0880)	(0.1000)	(0.114)
Relative GDP	0.121***	0.139***	0.736***	0.731***	-0.0000514	-0.00214	0.118*	0.111
	(0.0248)	(0.0292)	(0.0835)	(0.0991)	(0.0116)	(0.0130)	(0.0616)	(0.0720)
Fiscal Balance	0.0715*	0.0216	0.0355	0.0236	0.0295**	0.0283*	0.0519**	0.0453
	(0.0378)	(0.0399)	(0.0413)	(0.0464)	(0.0144)	(0.0160)	(0.0256)	(0.0292)
Credit to Private Sector	0.0264***	0.0204***	0.00731	0.00883	0.000374	-0.0000235	-0.00151	-0.000440
	(0.00390)	(0.00408)	(0.00920)	(0.0115)	(0.00187)	(0.00203)	(0.00576)	(0.00722)
Inflation Rate	-0.0292**	-0.0586***	-0.00473	-0.0118	-0.0166**	-0.0347***	-0.0141	-0.0350***
	(0.0141)	(0.0137)	(0.0102)	(0.0104)	(0.00837)	(0.00985)	(0.00873)	(0.00939)
Real Interest Rate	-0.0325**	-0.0200	-0.0137	0.00351	-0.0146**	-0.0235***	-0.0105	-0.0128
	(0.0139)	(0.0148)	(0.0130)	(0.0140)	(0.00618)	(0.00690)	(0.00926)	(0.0111)
Trade Openness		-0.00203		0.0228**		-0.00144		0.0183***
		(0.00277)		(0.0110)		(0.00129)		(0.00626)
Capital Account Openness		-0.00348***		0.00269*		-0.0000315		0.000507
		(0.00115)		(0.00161)		(0.000489)		(0.000970)
Net Foreign Assets Position		0.0570***		0.00444		0.00726*		0.0123
		(0.00825)		(0.0132)		(0.00409)		(0.00840)
Terms of Trade		0.0143**		0.0430***		-0.00246		0.00770*
		(0.00568)		(0.00659)		(0.00256)		(0.00400)
REER's Misalignment		0.00570		-0.00142		-0.00396		-0.00418
		(0.0203)		(0.0132)		(0.00855)		(0.00868)
Constant	0.206***	0.138***	-0.167	-0.251*	0.0411**	0.0611***	0.000200	-0.00964
	(0.0367)	(0.0461)	(0.112)	(0.144)	(0.0166)	(0.0203)	(0.0725)	(0.0967)
Observations	2003	1778	2003	1778	2000	1775	2000	1775
Number of id	95	95	95	95	95	95	95	95
Extreme Point (SLM Test)	0.457	0.438	0.453	0.444	0.444	0.474	0.465	0.538
p-value (SLM Test)	0.000	0.000	0.077	0.089	0.000	0.015	0.162	0.380

Standard errors in parentheses. ***p<0.01, **p<0.05, * p<0.1. Time period: 1990-2015. All models includes time effects.

6.3.2 Subsamples of Advanced and Developing economies.

Table 3 presents the regressions corresponding to the expanded model for several subsamples. Partitions are considered by level of development, openness (commercial and financial) and credit availability. The first is based on the IMF classification, while the rest is determined based on the average level of each country with respect to the 75th percentile of the entire sample.

For example, in the subsamples of advanced and developing countries, all the coefficients except one have the same signs in the two subsamples, therefore, they coincide with the signs of the complete sample. In both groups the coefficients associated with inequality have the expected signs and are significant, replicating the U-shape.

The inertia and the coefficient associated with the expectations of future growth are lower. Credit is only significant in advanced countries. The real interest rate is the only variable where the signs are opposed. The real rate only negatively affects investment in developing countries and positively in advanced countries. This is opposite to what is known as the McKinnon-Shaw hypothesis (McKinnon, 1973). As it was postulated in the empirical model, the terms of trade are positive in both subsamples, but significant only in the developing ones, showing that trade may be more biased toward an inter-industrial than an intra-industrial pattern. The variables related to the impact of the commercial and financial opening on investment are positive only

in developing countries. Higher NFA only positively affect the advanced countries. The positive real exchange rate misalignment (overvaluation) that would positively affect investment is only significant in advanced countries.

As a test of robustness, the sub-samples behave very stably despite having a remarkably lower number of observations. Therefore, they confirm the assessments made for the complete model.

Table 3. Subsamples.

	(1) Advanced GFCF	(2) Developing GFCF	(3) Low K-open GFCF	(4) High K-open GFCF	(5) Low t-open GFCF	(6) High t-open GFCF	(7) Low cred GFCF	(8) High cred GFCF
Gini	-2.795**	-0.492***	-0.619	1.766	-0.578*	-2.691***	-0.592***	-1.378***
	(1.109)	(0.0684)	(0.400)	(4.463)	(0.296)	(0.437)	(0.204)	(0.176)
Gini squared	4.037*	0.660***	0.754**	-2.692	0.587	3.621***	0.634**	2.076***
	(2.292)	(0.167)	(0.354)	(5.844)	(0.408)	(0.416)	(0.256)	(0.301)
Gross Fixed Capital Formation(-1)	0.540***	0.724***	0.741***	0.619***	0.752***	0.730***	0.703***	0.673***
	(0.110)	(0.0341)	(0.0194)	(0.0996)	(0.0759)	(0.0198)	(0.00823)	(0.0600)
Output Gap	1.515	0.768	0.645***	7.182**	0.508***	1.639***	0.473***	2.545***
	(2.699)	(0.484)	(0.142)	(2.891)	(0.0203)	(0.486)	(0.0911)	(0.0540)
Growth Forecast	0.106***	0.543***	0.528***	-0.0396	0.472***	0.946***	0.543***	0.408***
	(0.0330)	(0.141)	(0.0290)	(0.714)	(0.0577)	(0.0345)	(0.0109)	(0.0569)
Relative GDP	-0.161	0.0112	-0.0179	-3.411***	-0.0197	-0.626**	0.0479	0.0197
	(0.777)	(0.181)	(0.244)	(0.171)	(0.0558)	(0.317)	(0.438)	(0.0728)
Fiscal Balance	0.0968	-0.00439	0.0252*	0.0900	-0.0289	0.206**	-0.0452***	0.190***
	(0.0837)	(0.0102)	(0.0129)	(0.261)	(0.0447)	(0.0970)	(0.000184)	(0.0671)
Credit to Private Sector	0.0242***	-0.0168	0.00448	0.0104***	-0.000266	0.0225***	-0.0190**	0.0204***
	(0.00353)	(0.0211)	(0.00371)	(0.00303)	(0.00742)	(0.00197)	(0.00755)	(0.00459)
Inflation Rate	-0.0951***	-0.0377***	-0.0347*	-0.0548	0.00899	-0.0716***	-0.0384***	-0.0921
	(0.0139)	(0.00274)	(0.0191)	(0.195)	(0.0300)	(0.0142)	(0.0114)	(0.166)
Real Interest Rate	0.0895***	-0.00609***	-0.00717	-0.0209	-0.000138	-0.0586***	-0.0106	0.156***
	(0.0130)	(0.00173)	(0.0152)	(0.202)	(0.0111)	(0.0138)	(0.0158)	(0.0603)
Trade Openness	-0.0262	0.0480***	0.0265***	-0.0706	0.0439*	0.0117	0.0569***	-0.00975***
	(0.0216)	(0.00958)	(0.00921)	(0.0581)	(0.0226)	(0.00810)	(0.000914)	(0.000364)
Capital Account Openness	0.00991	0.00119***	0.00141		0.00327**	-0.00428***	0.00139	0.00369
	(0.0117)	(5.12e-05)	(0.00127)		(0.00145)	(0.000975)	(0.00202)	(0.00300)
Net Foreign Assets Position	0.0461***	0.0210	0.0264	0.0427***	0.0277***	0.0294***	0.0235**	0.0387***
	(0.00884)	(0.0320)	(0.0317)	(0.00806)	(0.00785)	(0.0113)	(0.0107)	(0.0116)
Terms of Trade	0.0238	0.00296***	0.00660	0.0367	0.00222***	0.0210**	0.00136	0.0178***
	(0.0717)	(0.000458)	(0.00563)	(0.0302)	(0.000458)	(0.00945)	(0.00314)	(0.00327)
REER's Misalignment	0.0376*	0.0174	0.0185*	0.00391	0.0311*	0.00929	0.00829	0.0240*
	(0.0208)	(0.0139)	(0.0108)	(0.0101)	(0.0168)	(0.0552)	(0.0115)	(0.0136)
Observations	264	1,047	1,221	90	1,000	311	944	367
Number of id	25	70	88	7	73	22	67	28
CI 90%	[0.202	[0.202	[0.202	[0.202	[0.202	[0.202	[0.202	[0.202
	0.61]	0.61]	0.61]	0.61]	0.61]	0.61]	0.61]	0.61]
Extreme Point (SLM test)	0.346	0.373	0.41	0.328	0.491	0.371	0.466	0.331
SLM p-value	0.104	0.125	0.111	0.374	0.246	0.000	0.0479	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Time period: 1990-2015. All models includes time effects.

7. Conclusions.

The global economy has experienced a heterogeneous behavior of inequality and investment across countries. This has occurred simultaneously with a generalized process of integration of countries into the international economy through the commercial and financial channels, as well as the growing importance of the financial sector in every economy. In this context, this paper studies the relationship between investment and inequality, controlling for the global factors that have characterized the international economy in the last decades.

To analyze this multidimensional phenomenon, our work is built upon the convergence of three different strands of literature. First, it draws on the recent experience in connecting inequality with growth—though our work also takes notice of the face that, in the reduced forms that have been analyzed so far, the role of investment as a channel through which inequality affects growth has scarcely been studied. Second, our work responds to the traditional literature on determinants of investment in fixed capital, which does not account for inequality as a possible explanatory variable. Finally, to control for the greater internationalization of economies, we used a more open macroeconomic approach, referencing the literature that analyzes the current account, disaggregating its dynamics between savings and investment. In this way, considering these three sources, a balanced analysis is achieved that is a contribution to relatively sparse empirical research on the topic.

The empirical model studies the link between inequality and investment accounting for the degree of integration to the international economy and the main macroeconomic factor. For this, based on a panel of 95 countries from 1990 to 2015, six complementary econometric methods are used. The main results show that the inequality measured by the Gini coefficient is a significant determinant of investment and that this relationship is nonlinear, with a "U-shape," as confirmed by specific tests. This implies that at relatively low initial levels of the Gini coefficient (lower than 0.45) an increase in inequality generates a reduction in investment. But at relatively high initial levels of inequality (greater than 0.45) an increase in inequality incentives investment.

One possible explanation for this phenomenon would be that, in low-inequality countries, the "wage-led" regimes predominate, while in economies with high inequality, "profit-led" regimes predominate. In the first case, generally associated with advanced or middle-income economies (Stockhammer and Wildauer, 2015), the increase in inequality has among its main determinants the drop in the wage share (Checchi and Garcia-Peñaloza, 2010), so reduction in wages increases inequality and reduces investment and growth. Conversely, in the most unequal economies, if there are profit-led regimes—for example, “export-led”—then greater inequality due to a fall in the wage share increases profitability and, simultaneously, the savings available to expand investment.

The rest of the control variables have the expected signs, being relatively stable among the different econometric methodologies. The coefficients are positive in the variables related to the short- and long-term output, as well as the relative productivity of the country. The effect of greater financial depth measured by the credit-to-GDP ratio is positive and the real interest rate has a negative impact. The fiscal policy represented by the fiscal balance is positive for investment, while inflation has a negative effect. The terms of trade and an appreciated real exchange rate with respect to its long-run trend are also positive for investment. The same occurs with a greater international insertion of the economies. Countries with net creditor positions also have a higher level of investment.

When the sample is segmented between developing and advanced countries, although most of the signs are maintained, the size of some coefficients and their significance are modified. The credit-to-GDP ratio and the role of being net creditors are only significant in the advanced economies, while the terms of trade, the REER and the levels of commercial and financial openness are relevant only in developing countries. Future work should test whether the latter effects are connected to a greater presence of foreign direct investment in total investment.

From these results various policy implications arise. In the first place, it is confirmed that the impact of inequality on growth is transmitted through the investment in physical capital, which complements the literature that emphasizes the human capital channel. Future theoretical models that seek to explain aggregate investment and growth must take this specific channel into account.

Second, for countries with moderate inequality, given the high correlation between the wage share and inequality, it is clear that policies of wage restriction cause inequality to increase,

thus generating lower investment and growth, even if they can improve the current account (Carrera, Sardi and Rodríguez, 2017). Vis-à-vis the literature about the current account determinants, this paper put in evidence the importance of inequality on investment, supplementing the findings of previous studies that illustrated inequality's effect on the saving channel.

Third, it follows that processes of increases in inequality could have two opposite effects according to its initial level. Increasing inequality would be harmful for investment and, therefore, for productivity and growth in countries of moderate and low initial inequality. But conversely, in countries with relatively higher initial inequality, its increase would stimulate investment. If more inequality implies greater appropriation of income for sectors with higher savings capacity, the increase in desired investment could find part or all of the additional financing required.

Fourth, open economies with high levels of inequality could fall into a high-growth with high-inequality trap. In particular, if that growth is mainly based on the export of natural-resources-intensive commodities or low-wage goods and does not require a growing domestic market to sustain the greater supply of local goods, then there would be no endogenous dynamic that requires redistributive actions to sustain the investor´s benefits. The more internationally integrated the country is through trade and financial flows, the more likely this strategy of growth is sustainable. In a scenario like this, only a virtuous political dynamic might place these countries on the other side of the turning point—through an economic policy of structural change aimed at reducing inequality.

Notice that, in order to change the country from one equilibrium (the trap) to another, according to our empirical model the transformation of the productive sector should be big enough. If, on the other hand, the country is placed in the right-hand side in respect to the turning point of the "U," small decreases in income distribution reduce investment and growth.

In cases where it is desirable to move a country from one equilibrium to another, a "big push" can be necessary. This is not a big push in the sense of the traditional literature about industrialization (that refers to a huge increase in fixed capital (Murphy et al., 1989; Kraay, and McKenzie, 2014). Rather, a big push will be needed in the sense of changing the current productive model toward one that requires less inequality to invest and grow.

References.

Aghion, P., Caroli E. & Garcia-Penalosa C. (1999). "Inequality and Economic Growth: The Perspective of the New Growth Theories." Journal of Economic Literature, 37 (4): 1615-1660.

Alesina, A. y Perotti, R. (1996), “Income distribution, political instability, and investment”. European Economic Review 40: 1203-1228.

Alesina, A. & Rodrik, D. (1994). “Distributive politics and economic growth”. Quarterly Journal of Economics 109, no. 2: 465-490.

Alvaredo, F., Chancel, L., Piketty, T., Saez, E. & Zucman, G. (2018). “World Inequality Report 2018”. WID.

Anderson, T.W. y C. Hsiao (1981) “Estimation of Dynamic Models Using Panel Data”, Journal of the American Statistical Association, Vol. 76 (Sep., 1981), 598-606.

Arellano, M y S. R. Bond (1991) “Some Test Specification for Panel Data: Monte Carlo Evidence and Application to Employment Equations”, Review of Economic Studies, Vol. (Abr., 1991), 277-297.

Arellano, M. (1989) “A Note on the Anderson-Hsiao Estimator for Panel Data”, Economic Letters, Vol. 31 (Dic., 1989), 337-341.

Arellano, M. y O. Bover (1995) “Another Look at the Instrumental Variable Estimation of Error-Componentes Models”, Journal of Econometrics, Vol. 68 (Jul., 1995), 29-51.

Barro, R. (1991), “Economic Growth in a Cross Section of Countries”, The Quarterly Journal of Economics, 106, (2), 407-443

Barro, R (2000). Inequality and Growth in a Panel of Countries. Journal of Economic Growth, March 2000.

Baldwin, R. E. (1956). “Patterns of Development in Newly Settled Regions”. The Manchester School Volume 24, Issue 2

Banerjee, A. V. (2004), “Inequality and Investment”, MIT, December 2004. Available at: https://economics.mit.edu/files/514

Banerjee, A. V. & Duflo, E. (2003), “Inequality and growth: what can the data say?” National Bureau of Economic Research.

Bazzi, S. & Clemens, M. (2009). “Blunt Instruments: On Establishing the Causes of Economic Growth,” Working Paper No. 171 (Washington: Center for Global Development).

Berg., A. & Ostry, J. (2011). “Inequality and Unsustainable Growth: Two Sides of the Same Coin?”, IMF Staff Discussion Note, April 8, 2011, SDN/11/08

Berg., A. & Ostry, J. (2011). “Inequality and Unsustainable Growth: Two Sides of the Same Coin?”, IMF Staff Discussion Note, April 8, 2011, SDN/11/08

Berg., A., Ostry, J. & Tsangarides, G. (2014). “Redistribution, Inequality, and Growth”, IMF Staff Discussion Note.

Becker, G. (1977), A Theory of the Production and Allocation of Effort, No 0184, NBER Working Papers, National Bureau of Economic Research, Inc

Benhabib, J. (2003). "The Tradeoff Between Inequality and Growth," Annals of Economics and Finance, Society for AEF, vol. 4(2), pages 491-507, November.

Bernanke, B., Gertler, M. & Gilchrist, S. (1996). "The Financial Accelerator and the Flight to Quality," The Review of Economics and Statistics, MIT Press, vol. 78(1), pages 1-15, February.

Bhaduri, A. & Marglin, S. (1990). “Unemployment and the Real Wage: The Economic Basis for Contesting Political Ideologies”, Cambridge Journal of Economics, 14, (4), 375-93.

Blanchard, O. & Fisher S. (1989). “Lectures on Macroeconomics”, The MIT Press ISBN: 9780262022835, 664 pp March 1989.

Blecker, R. A. (2016). “Wage-led versus profit-led demand regimes: the long and the short of it”, Review of Keynesian Economics, 4(4).

Blinder, A. (1975). “Distribution Effects and the Aggregate Consumption Function”, Journal of Political Economy, 83, (3), 447-75.

Blundell, R. & Bond, S. (1998). “Initial conditions and moment restrictions in dynamic panel data models”, Journal of Econometrics, 87, (1), 115-143.

Bofinger, P. & Scheuermeyer P. (2016). “Income Distribution and Household Saving: A Non-Monotonic Relationship”, Annual Conference 2016 (Augsburg): Demographic Change, Verein für Socialpolitik.

Bortz, P. G. (2016). “Financial flows in a Kaleckian framework” Doctoral dissertation, TU Delft, Delft University of Technology.

Bourguignon, F. (1981). “Pareto Superiority of Unegalitarian Equilibria in Stiglitz' Model of Wealth Distribution with Convex Saving Function”, Econometrica, 49, (6), 1469-75.

Bowsher, C. (2002) “On Testing Overidentifying Restrictions in Dynamic Panel Data Models”, Economics Letters, Vol. 77, 211-220.

Brueckner, M. & Lederman, D. (2015). “Effects of income inequality on aggregate output”, No 7317, Policy Research Working Paper Series, The World Bank.

Bastourre, D., Carrera, J. & Ibarlucia, J. (2009) What is Driving Reserve Accumulation? A Dynamic Panel Data Approach. Review of International Economics, V17, 4, September, pp. 861-877.

Carrera, J., Sardi, M. & Restout, R. (2016). "An Agnostic Assessment of Real Exchange Rates Dynamics in Latin-American Countries”. ANALES DE LA AAEP. Tucumán. Noviembre 2016. ISBN 978-987-28590-4-6.

Carrera, J., Rodríguez, E. and Sardi, M. (2017). “The Impact of Income Distribution on the Current Account”, Journal of Globalization and Development. V7 Issue 2. De Gruyter.

Cavallo, E. A. & Pedemonte, M. (2015). “What is the Relationship between National Saving and Investment in Latin America and the Caribbean?”. IDB Working Paper No. IDB-WP-617. Available at SSRN: https://ssrn.com/abstract=2729729 or http://dx.doi.org/10.2139/ssrn.2729729

Checchi, D., & García-Peñalosa, C. (2010). “Labour market institutions and the personal distribution of income in the OECD”. Economica, Volume77, Issue307. July. Pages 413-450.

Cynamon B. & Fazzari, S. (2016). “Inequality, the Great Recession and slow recovery”, Cambridge Journal of Economics, 40, (2), 373-399

Cingano, F. (2014). “Trends in Income Inequality and its Impact on Economic Growth”, OECD Social, Employment and Migration Working Papers, No. 163, OECD Publishing. http://dx.doi.org/10.1787/5jxrjncwxv6j-en

Chinn, M. D., & Prasad, E. S. (2003). “Medium-term determinants of current accounts in industrial and developing countries: an empirical exploration”,.Journal of International Economics, 59(1), 47-76.

Chinn, M, D. & Ito, H. (2006). "What Matters for Financial Development? Capital Controls, Institutions, and Interactions," Journal of Development Economics, Volume 81, Issue 1, Pages 163-192 (October). Updated to 2015.

Chinn, M. D., Eichengreen, B., & Ito, H. (2012). “Rebalancing global growth”.Ascent after Descent: Regrowing Economic Growth after the Great Recession, Washington DC: World Bank, 35-86.

Combey, A. (2016). “The Main Determinants of Private Investments in the WAEMU Zone: The Dynamic Approach, MPRA Paper No. 75428.

Crespo Cuaresma J., Kubala J. & Petrikova, K. (2016). "Does income inequality affect aggregate consumption? Revisiting the evidence," Working Papers wuwp210, Vienna University of Economics and Business,

Darvas, Zsolt (2012a) ‘Real effective exchange rates for 178 countries: a new database‘, Working Paper 2012/06, Bruegel, 15 March 2012. Disponible en: http://bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database

De Dominicis, L., Florax R. & de Groot, H. (2008). “A Meta-analysis on the Relationship between Income Inequality and Economic Growth”, Scottish Journal of Political Economy, 55, (5), 654-682

Duesenberry, J. S. (1949). Income, saving, and the theory of consumer behavior.

Easterly, W. (2007). “Inequality does cause underdevelopment: Insights from a new instrument”, Journal of Development Economics, 84, (2), 755-776

Feldstein, M. & Horioka, C. (1980). “Domestic Saving and International Capital Flows”, The Economic Journal, Vol. 90, No. 358 (Jun., 1980), pp. 314-329

Ferreira, F. H., Messina, J., Rigolini, J., López-Calva, L. F., Lugo, M. A., Vakis, R., & Ló, L. F. (2012). “Economic mobility and the rise of the Latin American middle class”. World Bank Publications.

Forbes, K. J. (2000). "A Reassessment of the Relationship between Inequality and Growth." American Economic Review, 90 (4): 869-887.

Frank, R., Levine, A. & Dijk, O. (2014). “Expenditure Cascades”. Review of Behavioral Economics: Vol. 1: No. 1–2, pp 55-73. http://dx.doi.org/10.1561/105.00000003.

Friedman, M. & Friedman, R. (1979), “Libertad de Elegir”. Ediciones Orbis S.A., Madrid, 1983.

Galor, O. (2011). "Inequality, Human Capital Formation and the Process of Development," Working Papers 2011-7, Brown University, Department of Economics.

Galor, O. & Moav, O. (2004). “From Physical to Human Capital Accumulation: Inequality and the Process of Development”. The Review of Economic Studies, Vol. 71, N°4, páginas 1001-1026.

Galor, O. & Zeira, J. (1993). “Income Distribution and Macroeconomics”. The Review of Economic Studies, Volume 60, Issue 1, 1 January 1993, Pages 35–52.

Gould, E. D. & Hijzen, A. (2016). “Growing Apart, Losing Trust? The Impact of Inequality on Social Capital”, IMF Working Paper No. 16/176. Available at SSRN: https://ssrn.com/abstract=2882614.

Gourinchas, P. & Jeanne, O. (2009). “Capital Flows to Developing Countries: The Allocation Puzzle”, No WP09-12, Working Paper Series, Peterson Institute for International Economics

Guzman, M., Ocampo, J. A. & Stiglitz, J, (2018). "Real exchange rate policies for economic development," World Development, vol 110, pages 51-62.

Hansen, L. P. (1982) “Large Sample Properties of Generalized Method of Moments Estimators” Econometrica, Vol. 50 (Jul., 1982), 1029-1054.

Hauk, W. & Wacziarg, R. (2009), “A Monte Carlo Study of Growth Regressions,” JEG, Vol. 14 (2), pp. 103–47.

Hsiao, C. (1986) “Analysis of Panel Data”, Cambridge, Cambridge University Press, 1986.

IMF (2005). “Globalization and External Imbalances”, World Economic Outlook, April.

IMF (2017). “Tackling Inequality”, Fiscal Monitor, October.

Jorgenson, D. (1963). “Capital Theory and Investment Behavior.” American Economic Review 53, no. 2: 247-259.

Kaldor, N (1961). Capital Accumulation and Economic Growth., 177–222. London, UK: Macmillan.

Kalecki, M (1971). Selected Essays on the Dynamics of the Capitalist Economy, 1933–1970. Cambridge: Cambridge University Press.

Kanbur, R. and Stiglitz, J. (2015). “Wealth and income distribution: New theories needed for a new era”. VOX CEPR’s Policy Portal. Available at: http://www.voxeu.org/article/wealth-and-income-distribution-new-theories-needed-new-era

Keynes, J.M. (1936). “The General Theory of Employment, Interest and Money”.

Kiviet, J.F. (1995) “On Bias, Inconsistency, and Efficiency of Various Estimators in Dynamic Panel Data Models”, Journal of Econometrics, Vol. 68 (Jul., 1995), 53-78.

Kraay A. & McKenzie D. (2014). “Do Poverty Traps Exist? Assessing the Evidence”, Journal of Economic Perspectives—Volume 28, Number 3—Summer 2014—Pages 127–148

Krueger, A. B. (2012). “The Rise and Consequences of Inequality”. Council of Economic Advisers. January 12, 2012.

Krugman, P. (2013), Inequality and Recovery. Post en el blog The Conscience of a Liberal del New York Times.http://krugman.blogs.nytimes.com/2013/01/20/inequality-and-recovery

Kuznets, S. (1955). “Economic Growth and Income Inequality”. The AER, Vol. 45, N°1.

Lane, P. R., & Milesi-Ferretti, G. M. (2007). “The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities”, 1970–2004.JIE, 73(2), 223-250.

Lazear, E. & Rosen, S. (1981). “Rank-Order Tournaments as Optimum Labor Contracts”, Journal of Political Economy, 89, (5), 841-64

Levine, R. & Renelt, D. (1992). "A Sensitivity Analysis of Cross-Country Growth Regressions," American Economic Review, American Economic Association, vol. 82(4), pages 942-963, September.

Lewis, W. A. (1954). “Economic Development with Unlimited Supplies of Labour”. The Manchester School Volume 22, Issue 2.

Li, H. & Zou, H. (1998). “Income Inequality Is Not Harmful for Growth: Theory and Evidence”, No 74, CEMA Working Papers, China Economics and Management Academy, Central University of Finance and Economics.

Lind, J. T. and Mehlum, H. (2010). With or Without U? The Appropriate Test for a U-Shaped Relationship. Oxford Bulletin of Economics and Statistics, 72(1):109{118.

Lucas, R. Jr. (1990). “Why Doesn't Capital Flow from Rich to Poor Countries? The American Economic Review Vol. 80, No. 2, Papers and Proceedings of the Hundred and Second Annual Meeting of the AAA (May, 1990).

McKinnon, R. I., (1973). “Money and Capital in Economic Development”, Washington: The Brookings Institution.

Milanovic, B. L. Van Der Weide, R. (2014). “Inequality is bad for growth of the poor (but not for that of the rich) “. Policy Research WPS 6963. Washington, DC: World Bank Group.

Minsky, H. (1995). "Financial Factors in the Economics of Capitalism", Hyman P. Minsky Arch. 64.

Mirrless, J. A. (1971). “An Exploration in the Theory of Optimum Income Taxation”. The Review of Economic Studies Vol. 38, No. 2 (Apr., 1971), pp. 175-208.

Murphy, K., Shleifer, A. & Vishny, R. (1989), “Income distribution, market size, and industrialization”. Quarterly Journal of Economics 104: 537-564.

Nickell, S. (1981) “Biases in Dynamic Models with Fixed Effects”, Econometrica, Vol. 49 (Nov., 1981), 1417-1426.

Nolan B., Rahbari E., Richiardi M., Valenzuela Rivera L. & Nabarro B. (2017). “Inequality and Prosperity in the Industrialized World. Addressing a Growing Challenge”. Citi GPS: Global Perspectives & Solutions, September, 2017.

North, D. C. (1959). Agriculture in regional Economic growth (Vol. 41). Oxford journals. Oxford University press.

OECD (2014). “Does income inequality hurt economic growth? Focus on Inequality and Growth, DELS Affairs.

Okun, A. (1975). “Equality and Efficiency: The Big Tradeoff”. Washington: Brookings Institution Press.

Onaran, O. & Obst, T. (2016). “Wage-led growth in the EU15 member-states: the effects of income distribution on growth, investment, trade balance and inflation”, Cambridge Journal of Economics, 40, (6), 1517-1551

Palley, T. I. (2015). “Inequality, the Financial Crisis and Stagnation: Competing Stories and Why They Matter” (No. 151-2015). IMK at the Hans Boeckler Foundation, Macroeconomic Policy Institute.

Pelgrin F., Schich, S. & de Serres, A. (2002), “Increases in Business Investment Rates in OECD Countries in the 1990s: How Much Can Be Explained by Fundamentals?”, No 327, OECD Economics Department Working Papers.

Perotti, R. (1996). “Growth, income distribution and democracy: What the data say”. Journal of Economic Growth, June 1996, Volume 1, Issue 2, pp 149–187.

Persson, T. & Tabellini, G. (1994). “Is Inequality Harmful for Growth?”, American Economic Review, 84, (3), 600-621.

Phillips, M. S., Catão, M. L., Ricci, M. L. A., Bems, R., Das, M., Di Giovanni, J., ... & Vargas, M. M. (2016). “The External Balance Assessment (EBA) Methodology” (No. 13-272). International Monetary Fund.

Piketty, T. (2014). “Capital in the 21st Century”. Cambridge: Harvard University.

Rajan, R. (2010). “Fault Lines: How Hidden Fault Lines Still Threaten the World Economy”, Princeton University Press.

Rodrik, D. (1999). “Where Did All the Growth Go? External Shocks, Social Conflict, and Growth Collapses”, Journal of Economic Growth, December 1999, Volume 4, Issue 4, pp 385–412.

Romer, P. M. (1986). “Increasing Returns and Long Run Growth,” Journal of Political Economy, 94, 1002–37.

Roodman, D. (2009). "How to do xtabond2: An introduction to difference and system GMM in Stata," Stata Journal, StataCorp LP, vol. 9(1), pages 86-136, March.

Rubin, D. B. (1987). Multiple Imputation for Nonresponse in Surveys. John Wiley and Sons, Inc.

Sala-i-Martin, X. (1997), I Just Ran Two Million Regressions, AER, 87, (2), 178-83.

Samuelson, P. (1939). “Interactions between the multiplier analysis and the principle of acceleration”. Review of Economic Statistics, 21: 75–8.

Sasabuchi, S. (1980). A test of a multivariate normal mean with composite hypotheses determined by linear inequalities. Biometrika, 67(2):429{439.

Schmidt-Hebbel K. & Servén, L. (2000). “Does income inequality raise aggregate saving?”, Journal of Development Economics, 61, (2), 417-446.

Serven, L. (2003). “Real-Exchange-Rate Uncertainty and Private Investment in LDCS”, The Review of Economics and Statistics, 85, (1), 212-218

Shapiro, M. D. (1986). “Capital utilization and capital accumulation: Theory and evidence”. Journal of Applied Econometrics Volume 1, Issue 3.

Solt, F. (2016). “The Standardized World Income Inequality Database." Social Science Quarterly 97. SWIID Version 6.1, October 2017.

Standard and Poor's (2014). “How Increasing Income Inequality is Dampening U.S. Economic Growth, And Possible Ways to Change the Tide”, RatingsDirect, August 2014.

Stiglitz, J. (1997). “Algunas enseñanzas del milagro del Este asiático”. Desarrollo Económico, vol. 37 N° 147.

Stiglitz, J. (2012). “The Price of Inequality: How Today’s Divided Society Endangers our Future”. Taurus, Alfaguara S.A.

Stiglitz, J. (2013). “Inequality is holding back the recovery”. Opinionator, The New York Times. Available at http://opinionator.blogs.nytimes.com/2013/01/19/inequality-is-holding-back-the-recovery/

Stiglitz, J. (2015). “Inequality and Economic Growth”. The Political Quarterly Volume 86, Issue S1.

Stockhammer, E. (2012). “Financialization, income distribution and the crisis”. Investigación Económica, 71(279).

Stockhammer, E., Hein, E., & Grafl, L. (2011). “Globalization and the effects of changes in functional income distribution on aggregate demand in Germany”. International Review of Applied Economics, 25(1), 1-23.

Stockhammer, E., Onaran, Ö., & Ederer, S. (2009). “Functional income distribution and aggregate demand in the Euro area”. Cambridge Journal of Economics, 33(1), 139-159.

Stockhammer, E., & Wildauer, R. (2015). Debt-driven growth? Wealth, distribution and demand in OECD countries. Cambridge Journal of Economics.

Summers, L. H. (2015). "Demand Side Secular Stagnation." AER, 105 (5): 60-65.

Windmeijer, F. (2005). “A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM Estimators”, Journal of Econometrics, Vol. 126 (May 2005), 25-51.

Wooldridge, J., (2002), “Econometric Analysis of Cross Section and Panel Data”, The MIT Press.

Wooldridge J. (2012), “Introductory Econometrics: A Modern Approach”, Fifth Edition.

Appendix 1. Database Description.

A1.1 Variables. Definitions and sources.[15]

Gross Fixed Capital Formation (% GDP) ("GFCF"). World Bank's "World Development Indicators" (WDI) database. **Gini Coefficient (post-tax, post-transfer) ("Gini").** "Standardized World Income Inequality Database," compiled by Solt (2016), version 6.1. **Net Foreign Assets Position (% GDP) ("nfa").** World Bank's "World Development Indicators" (WDI) database. **Credit to the Private Sector (% GDP) ("cred")**. World Bank's "World Development Indicators" (WDI) database. **Real Interest Rate (%) ("real_interest")**. World Bank's "World Development Indicators" (WDI) database. **Inflation, consumer prices (annual %) ("inflation").** World Bank's "World Development Indicators" (WDI) database. **Fiscal Balance (% GDP) ("fiscal").** IMF's WEO database (General Government net lending/borrowing), supplemented with data from the OECD and the European Commission's "Annual Macro-Economic Database" (AMECO) (General Government net lending/net borrowing). **Output Gap (% GDP) ("output_gap").** Estimated with a Hodrick-Prescott filter based on the "GDP per capita, PPP (constant 2011 international $)" from World Bank's "World Development Indicators" (WDI) database. **Five-Year Growth Forecast (%) ("gr_forecast").** IMF's WEO database. **PPP-converted GDP Per Capita (constant 2011 international U$S) ("gdp_relative").** World Bank's "World Development Indicators" (WDI) database. The relative product is calculated as a percentage of the average product of the three largest economies: USA, Germany and Japan. **Trade Openness Index (% GDP) ("t_open").** Sum of exports and imports on product based on World Bank's "World Development Indicators" (WDI) database. **Capital Account Openness Index ("k_open").** Chinn and Ito (2006), online version updated to 2015. Switzerland series were completed with the maximum levels of openness possible, since for this country the series begins in 1996. **Net barter terms of trade index (log) (2011=100) ("tot).** World Bank's "World Development Indicators" (WDI) database. **Real Exchange Rate Misalignment (%) ("reer_mis").** The REER misalignment is calculated with respect to its long-term trend (obtained based on an Hodrick-Prescott filter) using data since 1980 for 67 trading partners.

A1.2. Countries included in the sample
Number of countries included: 95.
Time Period: 1990-2015

<u>Countries by Region:</u>

Africa (25): Algeria, Angola, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Cote d'Ivoire, Egypt, Kenya, Madagascar, Malawi, Mauritius, Morocco, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Swaziland, Tanzania, Togo, Uganda, Yemen.

Asia & Oceanía (21): Armenia, Australia, Azerbaijan, China, Fiji, Georgia, India, Iran, Israel, Japan, Jordan, Korea, Kyrgyzstan, Malaysia, Mongolia, New Zealand, Pakistan, Philippines, Singapore, Tajikistan, Thailand

Europe (26): Albania, Belarus, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Moldova, Netherlands, Norway, Poland, Romania, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom

Latin America & the Caribbean (21): Argentina, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela

North America (2): Canada, United States.

[15] Descriptive statistics and partial correlations are available upon request.

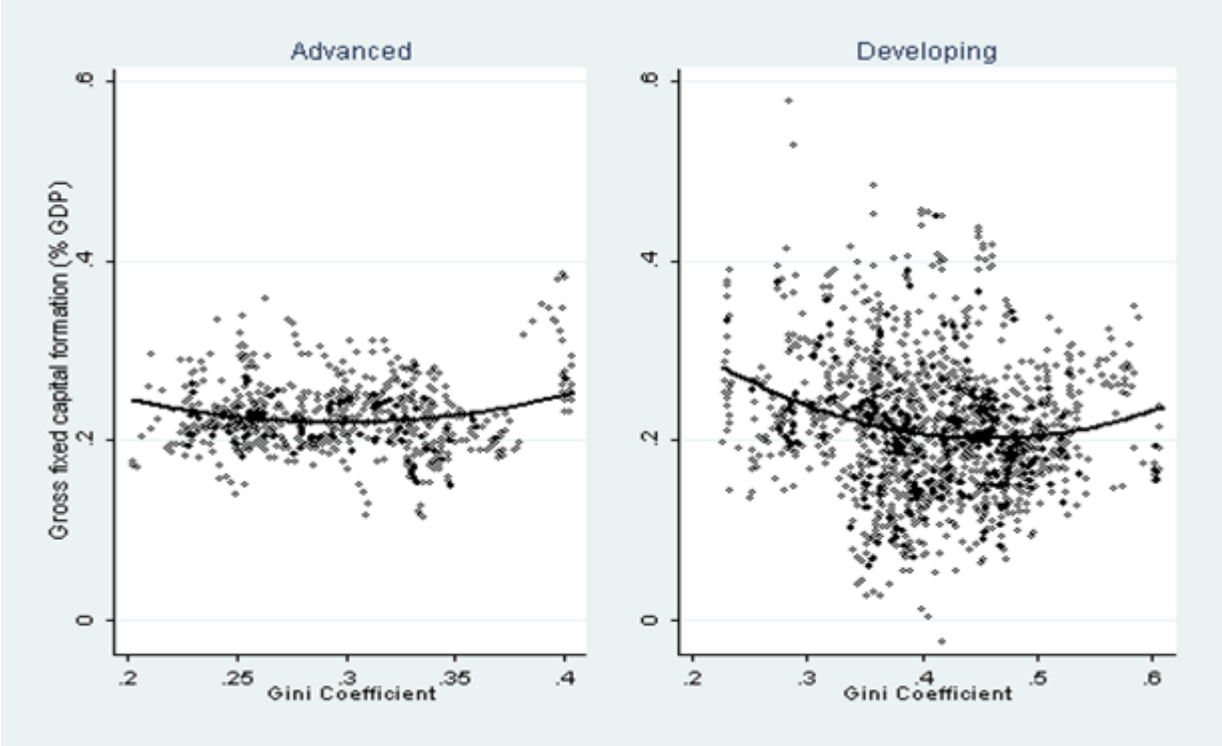
According to the classification used by the IMF, the partition between advanced and emerging countries is as follows:

Advanced economies (25): Australia, Belgium, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Singapore, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States.

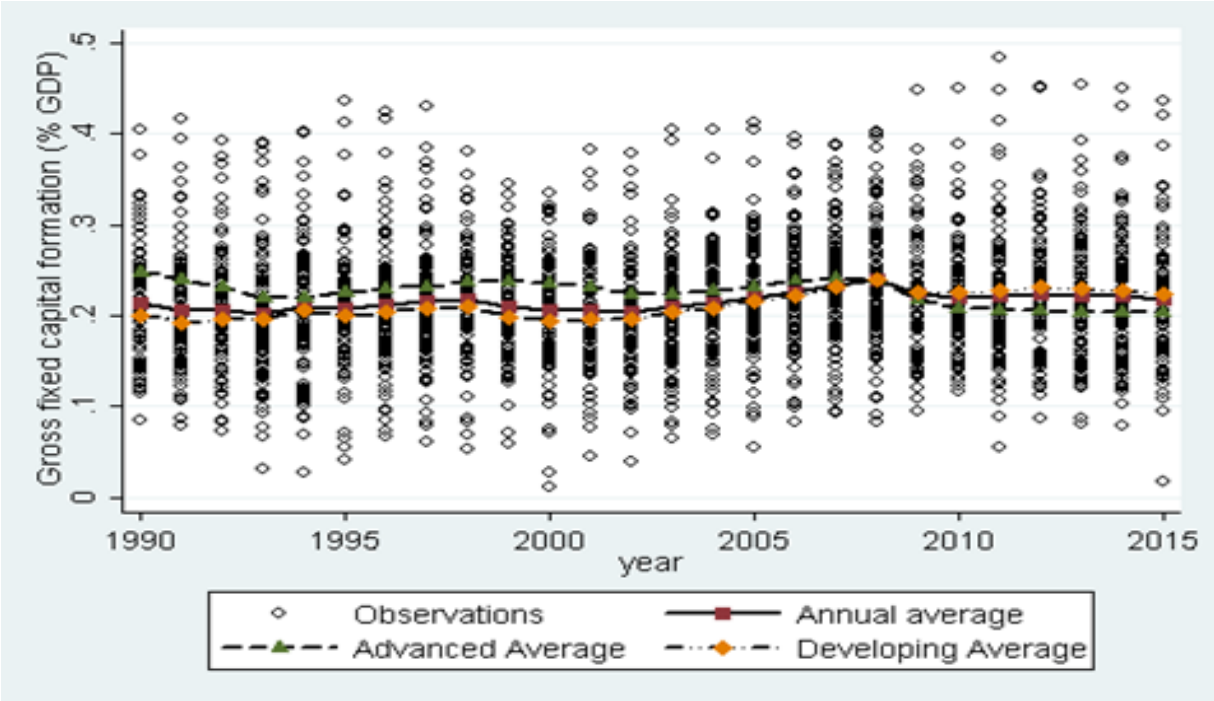
Emerging Market and Developing Economies (70): Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Barbados, Belarus, Belize, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cameroon, Central African Republic, Chile, China, Colombia, Costa Rica, Cote d'Ivoire, Croatia, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Georgia, Guatemala, Haiti, Honduras, Hungary, India, Iran, Jamaica, Jordan, Kenya, Korea, Kyrgyzstan, Madagascar, Malawi, Malaysia, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Niger, Nigeria, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Rwanda, Senegal, Sierra Leone, Swaziland, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Uganda, Ukraine, Uruguay, Venezuela, Yemen.

Appendix 2.

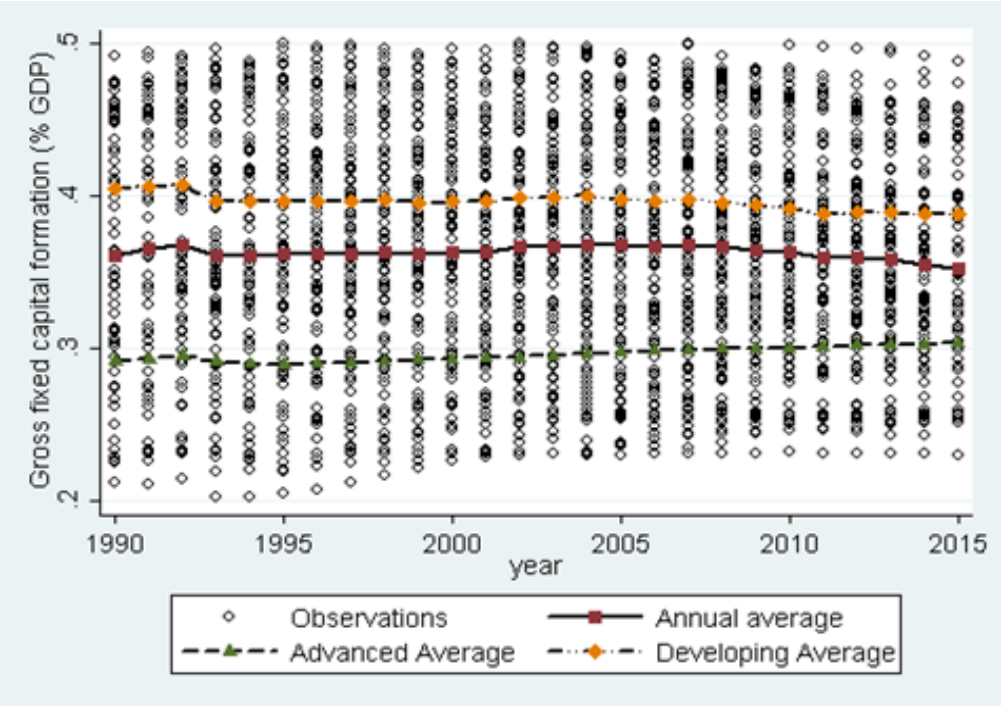
Investment and Gini. Scatter diagram. Advanced vs Developing. 1995-2015



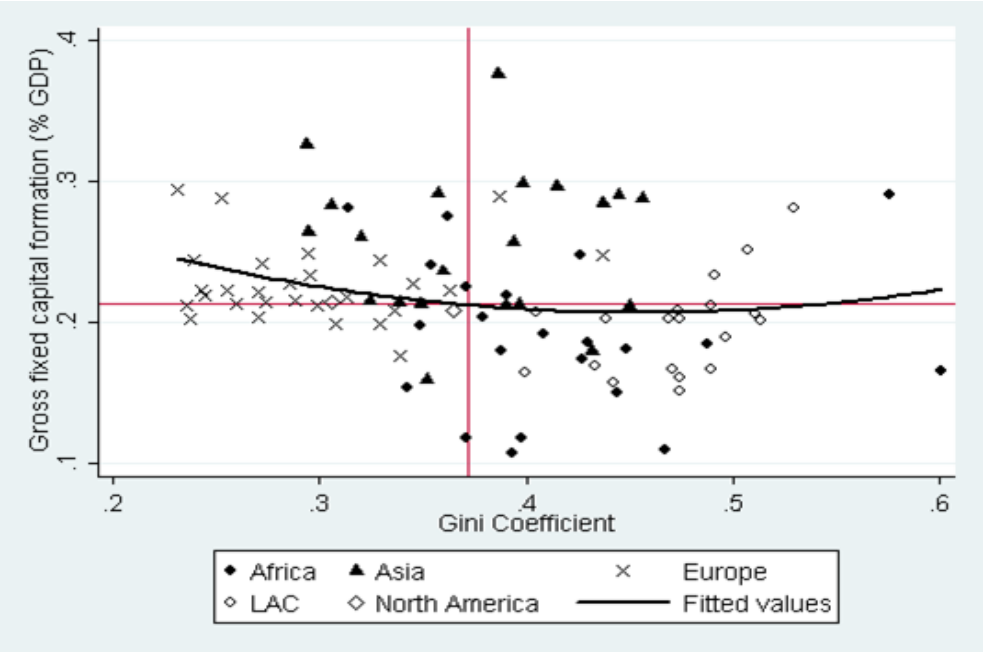
Gross Fixed Capital Formation (by country and world average). 1990-2015.



Gini coefficient (by country and world average). 1990-2015.

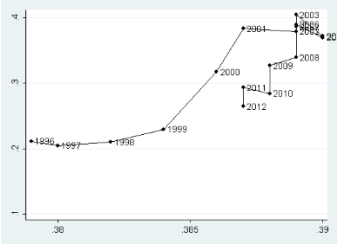


Investment and inequality averages. Scatter diagram. Regions.

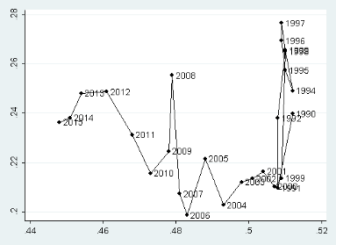


Appendix 3. Investment (vertical axis)-Inequality (horizontal axis) relationship. Selected countries.

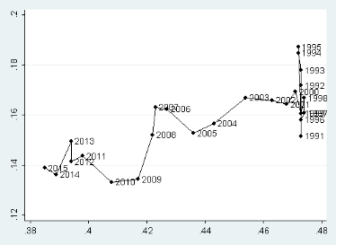
Albania



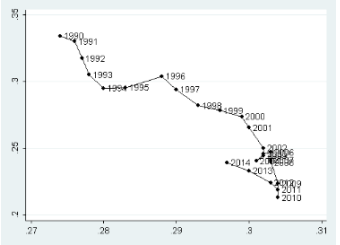
Chile



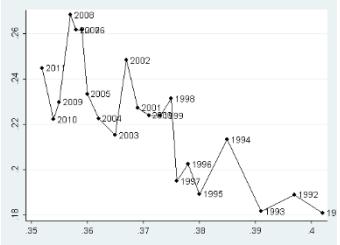
El Salvador



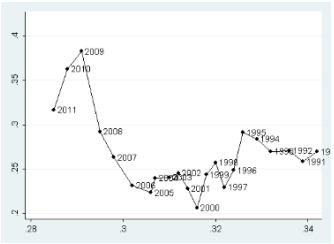
Japan



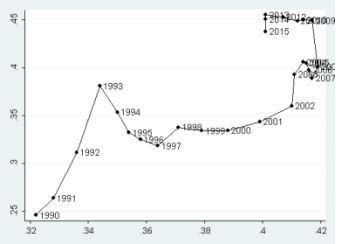
Senegal



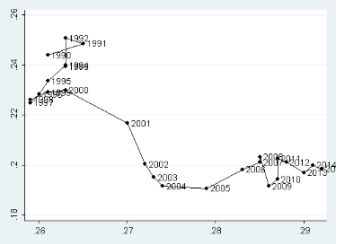
Algeria



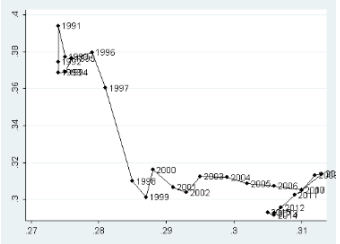
China



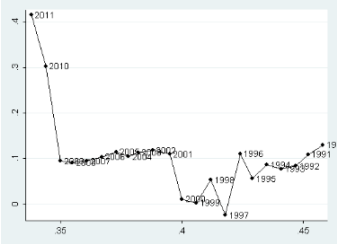
Germany



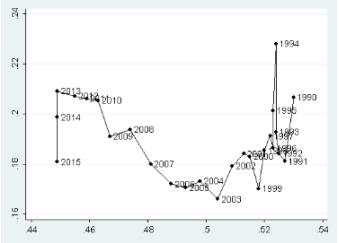
Korea



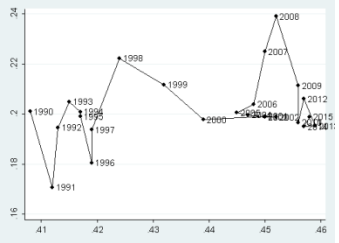
Sierra Leone



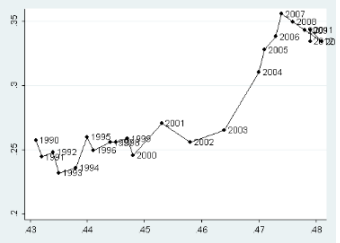
Brazil



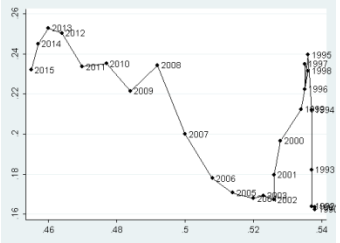
Costa Rica



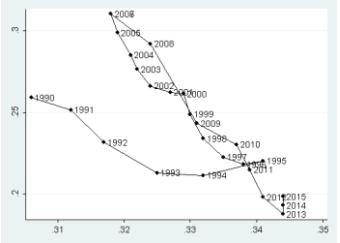
India



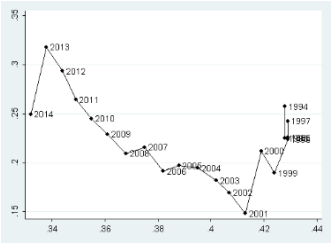
Peru



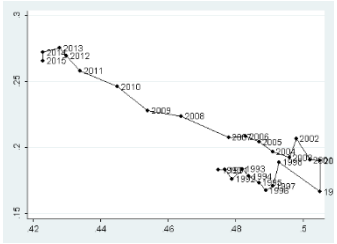
Spain



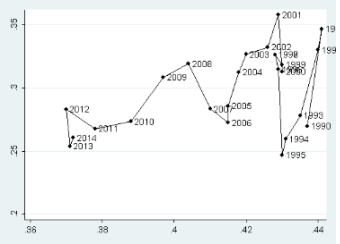
Burkina Faso



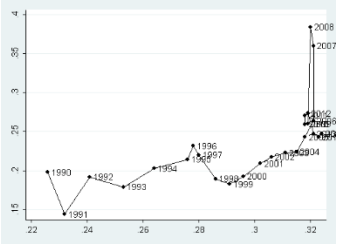
Ecuador



Iran



Romania



Tanzania