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Convergence, capital accumulation, and the world-system analysis

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Abstract

This article relates unweighted inequality between countries to the levels of the stock of capital per capita between countries. Based on the World-System analysis, we show that capital accumulation plays a key role in peripheral countries catching up the leading countries, however, in the World-System accumulation is a difficult result to achieve to peripheral countries. Using two databases (The Maddison Project and Penn World Tables), we show in this article that, through several indexes, between countries inequality increased from 1950 to 2008 and the minimal increase of the growth rates of the poor countries. Subsequently, we observed that inequality in the stock of capital per capita has increased and the scarce increase of the investment in the poor countries.

Keywords: convergence, capital accumulation, peripheral countries, World-system.
JEL classification: B20, B50, F60.

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Convergencia, acumulación de capital y el sistema-mundial

RESUMEN

Este artículo relaciona la desigualdad del producto per cápita entre países con los niveles de capital per cápita. Utilizando el análisis del sistema-mundial, mostramos que la acumulación de capital desempeña un papel importante para que los países periféricos alcancen a los países líderes en el largo plazo (convergencia). Usando dos bases de datos (The Maddison Project y Penn World Tables), exhibimos, a través de varios índices, que la desigualdad entre los países aumentó de 1950 a 2008, así como el mínimo crecimiento económico de los países más pobres. Posteriormente, observamos que la desigualdad en el stock de capital per cápita entre países ha aumentado a través de tiempo e igualmente se señala el escaso aumento de la inversión en los países periféricos.

Palabras clave: convergencia, países periféricos, sistema-mundial.
Clasificación JEL: B20, B50, F60.

1. INTRODUCTION

Even though capitalism is a system of increasing productivity, some social scientists have questioned whether or not inequality is rising or declining. This article has two objectives: to show the uptrend of inequality between countries from 1950 to 2008 using statistical tools such as the coefficient of variation and the Gini and Theil coefficients, and (2) to relate the uptrend of inequality between countries with the uptrend inequality of the stock of capital per capita between countries. To address this second objective, we use World-System analysis that highlights that core countries have higher levels of capital than peripheral countries, and that these core countries can have higher rates of accumulation than those classified as peripheral. To upgrade from the bottom to the top of the distribution of real GDP per capita, capital accumulation has to be increased. However, core countries and some special areas of the world concentrate the dynamics of capital accumulation, especially during long-term recessions.

The paper is organized as follows. Section 2 describes what inequality between countries is convergence and the reasons why countries in the world do not converge at real GDP per capita levels at purchasing power parity (PPP) through time. Section 3 takes into account inequality in the world using measures of inequality such as the coefficient of variation and the Gini and the Theil coefficients; also in this section, we present growth rates of countries grouped by quintiles and note that the top quintile has been quite stable through time. Section 4 relates real GDP per capita and real stock of capital per capita between countries. Similarly, that in the previous section, we show growth rates of capital stock grouped at the quintile level and demonstrate that the top quintile is quite stable. Finally, section 5 presents concluding remarks.

2. INEQUALITY BETWEEN COUNTRIES

There are three kinds of economic inequality: unweighted between countries, weighted between countries, and global inequality (Milanovic, 2007). In the first, one country of the world represents one observation in the construction of the measure of inequality; in the second, it is one observation weighted by the population of the country. Finally, the third takes into account not only inequality weighted by the population but also the distribution of income within countries (within-countries inequality) which is called global inequality.

In measuring inequality, Milanovic (2007) has noted that global inequality is the best, and weighted between-countries inequality is the worst. Unweighted between-countries inequality is useful because it shows "whether nations are converging (in terms of their income levels)" (Milanovic, 2007: 15). We are concerned about this last type of inequality in this article because it shows differences between rich and poor countries that can persist through time or even become greater. For example, the expectancy to have a high income must be higher in the US than in Mexico, even though both countries have billionaires.

In analyzing the evolution of inequality indexes such as that of Gini and Theil, O'Rourke (2001), following the data from Bourguignon and Morrison,

has asserted that unweighted between-countries inequality increased after World War II, Milanovic (2016) agrees with O'Rourke's assessment. In contrast, Firebaugh and Goesling (2004) have reported that inequality increased after WWII, but declined during the 1980s and 1990s.

For the neoclassical school of economic thought, reducing the transport cost, and adding free global mobility of capital and labor, will cause real GDP per capita to converge through time. According to O'Rourke (2001), the most important equalizing factor during the 19th century was labor mobility. In contrast, toward the end of the 20th century the most equalizing factor was capital mobility. Sala-i-Martin (2000) has claimed that not all the countries in the world must converge, just countries with the same level of investment rate, technology, depreciation, population growth rate, and institutions will have the same real GDP per capita levels through time, the so called conditional convergence. Meanwhile, Abramovitz (1986: 387) has reported that countries with low levels of productivity will grow faster than countries with higher levels of productivity; however, a problem to catching up the leaders is a set of non-quantifiable factors gathered under the term "social capability".

However, neoclassical scholars deny assigning to the state and to the monopolies any positive role in spurring growth. They also deny the existence of long-term and short-term secular cycles. Currently, there is a debate in social sciences whether or not convergence is really happening (Baumol *et al*., 1994; Sarkar, 1999; Pritchett, 1997; O' Rourke, 2001; Sutclife, 2003, 2004: Sala-i-Martin, 2000; Romer, 1996; Shultz, 1998; Clark, 2011; Foley and Michl, 1999, Jones, 2000; Chang, 2002; Milanovic, 2007; 2016).

Marxian tradition links capital accumulation to economic growth, the former being directed by the rate of profit (Foley and Michl, 1999). As peripheral countries are less productive and have higher rate of profit than core countries, capital can move in search of higher profitability. Then, the investment rate may rise, and a process of catching up can be carried out. Several Marxian strands reject this fact. First of all, for scholars such as Sweezy (1970; 1971), the existence of a monopoly obstructs free capital mobility, whereas for the dependency school, capital always flows from south to the north and not the opposite (Frank, 1972).

For the World-System analysis, capitalism is defined by the endless accumulation of capital (Wallerstein, 2004). Capitalism is a world economy integrated by states, competitive markets, firms, classes, political blocs, etc., (Wallerstein, 2001; 2004; Arrighi, 1994). All these institutions are linked in the world economy by an international division of labor constituted by chains of production and commercialization. The existence of monopolies and a strong state are characteristics of the countries at the top of the international division of labor (being high technology); by contrast, countries at the bottom of the international division of labor have a weak state and no monopolies (being low technology and high labor intensity) (Arrighi, and Drangel, 1986; Babones, 2005, and Prebish, 1986). As a consequence, core countries concentrate activities with a "large share of total surplus produce within a commodity chain" (Arrighi and Drangel, 1986: 11).

Countries at the top in terms of division of labor can continue growing faster than peripheral countries that concentrate activities at the bottom of the international division of labor because they have strong states, and they can establish monopolies, apply protectionism, and continue accumulating capital (Wallerstein, 2004; Arrighi, 1994). For this reason, to Wallerstein, the answer to the question of what makes a production process be located in core or peripheral areas is the following (2004: 18).

It came to be seen the answer lay in the degree to which particular processes were relatively monopolized or relatively free market. The processes that were relatively monopolized there were relatively far more profitable than those that were free market. This made the countries in which more core-like processes located wealthier.

Conversely, countries at the bottom are forced to embrace free trade and capital mobility because they cannot access the 'ladder' to development, as has been noted by many scholars, such as Chang (2002). Without specific policies to catch up to the leading countries, the gap between core and peripheral will increase. Many schools of economic thought, such as structuralism (Prebish, 1986) and the model of economic backwardness (Gerschenkron, 1962), addressed this problem after WWII. These theorists argued that backwardness in the peripheral countries would not be eliminated, unless the process of economic growth was a concerted effort.

The World-System analysis also recognizes a semiperipheral zone. The definition of this zone is problematic (Wallerstein, 1979; Arrighi, and Drangel, 1986; Babones, 2004). This article proposes that in the three layer-structure (core, semiperiphery, and periphery) upgrading is possible, depending primarily on the accumulation of capital led by the state (Wallerstein, 2004; Arrighi and Drangel, 1986).

World-System theorists stress the importance of the accumulation of capital. For example, Arrighi, and Drangel (1986: 12) point out that one of the main differences between core and periphery is the degree and speed of capital accumulation.

All states enclose within their boundaries both core and peripheral activities. Some (core states) enclose predominantly core activities and some (peripheral) enclose predominantly peripheral activities. As consequence, the former tends to be the locus of world accumulation and power and the latter the locus of exploitation and powerlessness.

A further example of the importance of capital accumulation is given by Wallerstein (1999: 36) in dealing with the rise of East Asia in the last 40 years. For him, cycles of two phases of 60-70 years are characteristic of the World-System: one phase is of economic expansion and the other phase is of economic recession, the former led by productive activities and the latter by financial activities (Kondratieff cycle).[1] During long-term economic expansion, accumulation is higher than during long-term economic recession; however, during global recession, the speed of accumulation of capital can rise in some specific areas:

For the majority of the areas of the world, such as Kondratieff B-phase is perceived as a downturn, or "bad times", in comparison with the previous A-phase. However, it is never the case that such a period is bad for everyone. For one thing, large capitalists, or at least some large capitalists, may be

[1] In the Marxian tradition, long-term expansions and recessions are determined by the profit rate. In Shaikh (1992), for example, in a long-term expansion, the rate of growth of mass of profit increases, capacity utilization rises, and accumulation of capital grows with some lag. If capital accumulation grows rapidly, capacity utilization will decrease and a long-term economic depression will occur (Shaikh, 1992).

able to find alternative profitable outlets such that their individual level of accumulation rises. And second, since one of the features of a Kondratieff B-phase is the relocation of productive activity, it is normally the case that some zone in the world-system sees a significant improvement in its overall economic standing.

The World-System is composed of nation-states that search to accumulate capital. Then, unlike the perception of neoclassical scholars, catching up is not a phenomenon of countries with the same characteristics[2] or a phenomenon of the free market; rather, it is a phenomenon led by the state and the dynamics of the World-System where polarization is common and catching up is given under special circumstances. An example of how the state can intervene in the accumulation of capital is through public debt. The state can create money to finance domestic activities or other states. Sometimes poor countries can promote development domestically through this external financing but sometimes they lag behind after loans because of the asphyxiating cost of foreign debt via amortization and the interest rate.

Finally, Wallerstein (1995) comments that accumulation of capital is carried out through a hierarchy during phases A and B of the Kondratieff cycle. During a phase B, core countries and the special areas where relocation of productive activities is carried out are served first; after, the remnants are left to semiperipheral and peripheral countries (Wallerstein, 1995: 33).

The second major difference derives from the fact that the world investment effort may be concentrated in China and Russia and China during the year 2000-2025 to a degree comparable to the concentration of investment in Western Europe and Japan in the years 1945-67/73. But this will mean that the amount that is left over for the rest of the world must be different in 2000-2025 than in 1945-67/73. In 1945-67/73, virtually the only "old" area where there was continued investment was the United States. In 2000-2025, continued investment will have to cover the United States, Western Europe, and Japan (and indeed a few others such as Korea, and Canada as well).

[2] With conditional convergence, poor countries converge to a certain some level and rich countries converge to another level. Transitions from poor countries to rich countries and vice versa are not possible. For a country to be rich, it must have had, throughout its history, the characteristics of a rich country. This assertion does not fit the history of the development of capitalism (Sarkar, 1999).

The question, therefore is, After one has invested in the "old" areas plus the "new" ones, how much will remain (even in small does) for the rest of the world? The answer will surely be much less than in the period, 1945-67/73.

In this article, we are relating inequality between countries to the levels of the stock of capital per capita. Therefore, in the next section we show that inequality between countries has increased from 1950 to 2008. We then describe the behavior of the world rates of GDP per capita divided by 10-year periods. Worth noting in this part of the section is the observation that poor countries have minimal growth; finally, we find that countries at the top of the income distribution are quite stable, and the exit and entrance to the top income distribution are hard to find.

3. INEQUALITY BETWEEN COUNTRIES

In this section, we describe the unweighted inequality between countries from 1950 to 2008, which can be used to show the evolution of economic convergence (Milanovic, 2007). The contents of this section include the following: (1) the evolution of unweighted between countries inequality through three indexes: the coefficient of variation and the Gini and Theil coefficients; (2) the evolution of the growth rates of the five income quintiles of real GDP per capita; and (3) no mobility in the countries that are in the top fifth quintile occurred from 1950 to 2008. Before proceeding to the three sections, the database we used is described.

Two databases (The Maddison Project and Penn World Tables) were merged to have the same number of countries and years available. Initially, in 1950, we obtained 49 countries: 8 countries for Africa, 18 for the Americas, 8 for Asia, 18 for Europe, and 1 for Oceania. In 1960, the database included 100 countries, and for 2008, we obtained 121 countries: 47 African countries, 22 countries from the Americas, 29 countries from Asia, 22 countries from Europe, and 1 country from Oceania (table 1 in the Appendix).[3] In 1950, the population for the countries in our sample encompassed almost 50% of the total world population.

[3] In contrast to the World Bank data base, these two data bases allow calculation of the evolution of inequality in long phases of expansion and recession.

Just a few years later, in the mid-1960s, the population of the countries in our sample reached near 75 percent. Since then, these countries have accounted for more than 80% of the total world population (figure 1A).

After obtaining our sample, we proceeded to calculate measures of inequality (coefficient of variation, Gini coefficient, and Theil coefficients) between countries using real per capita GDP at purchasing power parity (PPP) for the two databases.[4] To calculate the Gini[5] and Theil[6] coefficients, we divided our sample into five equal parts for each year from 1950 to 2008: quintile I was the poorest and quintile V the richest.[7] In so doing, we are not trying to identify the core, semiperipheral, and peripheral zone. Our objectives in this section is to describe that inequality has risen in the long-term and that most dynamic quantiles in economic growth are at the top of the distribution and not at the bottom.

Figure 1 plots the coefficient of variation for all the countries included in our database. This indicator is constructed around the mean and satisfies the Pigou-Dalton condition (Sen, 2001): a transfer from a rich country to poor one must increase the coefficient of variation and vice versa. Four tendencies can be singled out:

1) in the 1950s, inequality increased sharply;
2) from the 1960s to 1980s, inequality was stagnant (not without fluctuations);
3) from the end of the 80s throughout the 1990s, inequality increased,
4) and from the beginning of the 2000s onward, inequality decreased. We now explain the four tendencies.

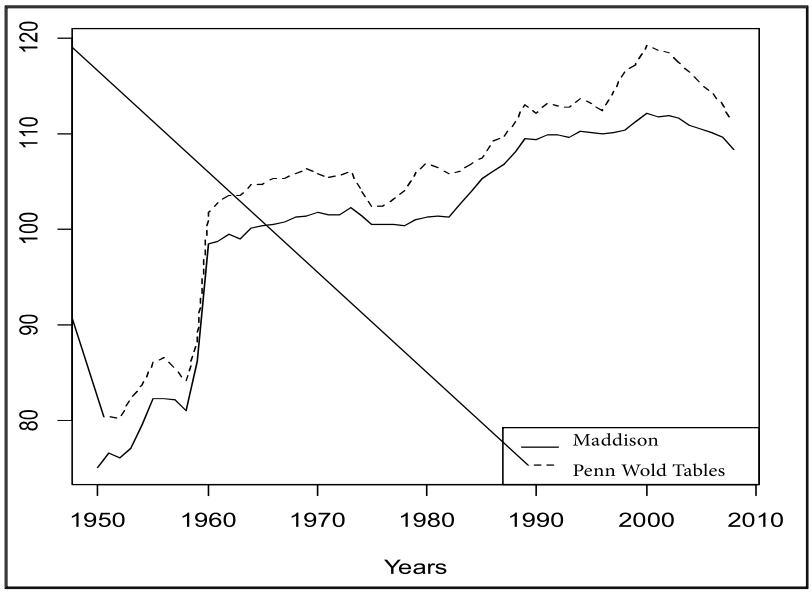
First, from 1958 to 1961, the database included newcomers (African and Asian countries were incorporated), the world was not more egalitarian at the beginning of the 1950s than at the end of the 1950s, and inequality increased

[4] Gini and Theil coefficients have the properties of mean and population size independence, and Pigou-Dalton the property of transfer sensitivity.
[5] The Gini coefficient is more sensitive to changes in the middle of the distribution.
[6] Theil-0 is the mean log deviation, and Theil-1 is the Theil coefficient known as L.
[7] In studying inequality, other scholars have used income shares at the quintile level (Clark 2011). Also, the top quintile resembles the leading countries at the 19th century, then, we can identify if mobility has occurred in this quintile.

because of the entry of these new countries. Second, from 1960 to the end of the 1970s, inequality grew at a slower pace and, especially at the end of the1960s, inequality declined. This decline resulted from the improvement in the second and fourth quintiles during the 1960s (table 1); during the 1970s, inequality was stagnant because of the decline in all income quintiles in the world. The evolution of inequality during the 1960s was influenced by the acceleration of growth in some countries such as those in Latin America.

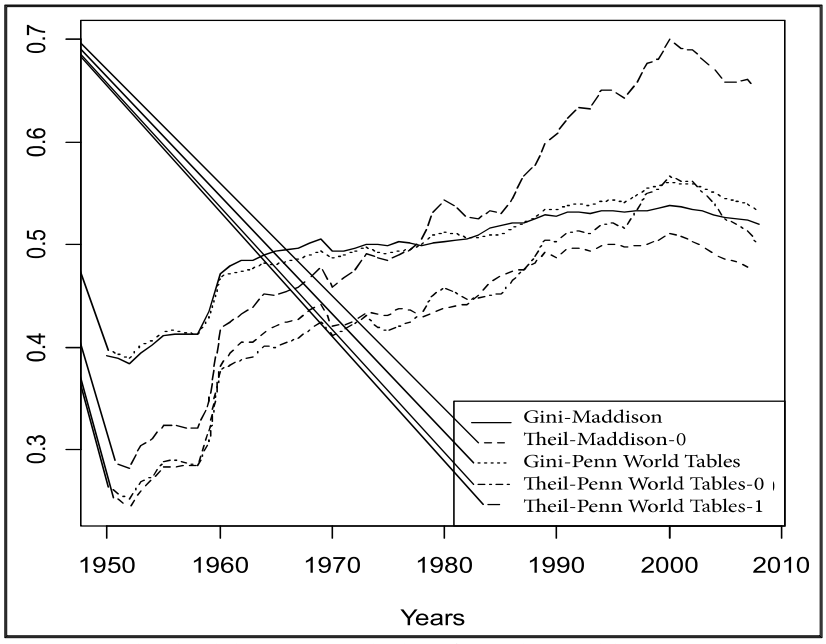
The evolution of inequality in the 1970s was influenced by the world recession of 1973; during this decade, western European countries and Japan generally reduced their growth rate drastically. Third, from 1980 throughout the 1990s, inequality increased because of the worsening conditions in almost all the countries in the world, except for the most advanced countries, due to neoliberalism. During the 1980s, the lowest four quintiles saw a severely reduced growth rate; meanwhile, during the 1990s, the four lowest quintiles had a slow recovery. Finally, from 2000s onward, the situation of the most advanced countries started to deteriorate, the situation of the medium income countries started to improve in comparison with the most advanced countries, and the poorest countries also improved their growth rates, and as a result the coefficient of variation decreased.

The same image of the evolution of the coefficient of variation is captured by the Gini and Theil coefficients except from the 1960 to the 1970 (figure 2). In this period, the Gini and Theil coefficients increased because the mid-income countries and the poorest countries in the world deteriorated in their GDP per capita levels in comparison with the top quintile, as can be seen in table 1. GDP per capita growth rates grew at a slower pace in the bottom quintiles than in the top quintiles (table 1). Also, the higher increase in the Theil-0 index (log mean deviation) than in the Gini index during the 1980s and 1990s suggests negative changes in the lower quintiles of the sample. This difference indicates that even countries in the first, second, and third quintiles have problems catching up. Finally, Theil-1, which is more sensitive to changes in higher values of the distribution, increased sharply during the 1980s and 1990s. All indexes show that from 2000 onward there was a decline in inequality between countries; however, inequality increased from 1950 to 2008.



Source: Author's elaboration with data from the maddison project (2013) and penn world tables (2015). R package 3.3.

FIGURE 1
Coefficient of variation of real GDP per capita at PPP



Source: Author's elaboration with data from the maddison project (2013) and penn world tables (2015). R package 3.3.

FIGURE 2
Gini and theil coefficients of inequality of real GDP per capita

Table 1 also shows the existence of a hierarchy in growth rates ordered by quintiles around the world. Usually, the top quintiles grow faster than the bottom quintiles (Pritchett, 1997). Conversely, poor countries grow at a slow pace. This fact denies the process of convergence through time between countries and supports the idea of the existence of a stable hierarchy among nations.

TABLE 1
Growth rate of real GDP per capita divided by Income's quintiles The Maddison Project

1951-1960		**1961-1970**	**1971-1980**	**1981-1990**	**1991-2000**	**2001-2008**
I	1.9	1.8	0.8	-0.4	-.5	1.6
II	1.5	2.6	1.01	0.6	1.2	3.4
III	3.0	2.9	2.9	0.15	1.9	2.6
IV	3.7	4.1	3.4	0.96	2.4	3.6
V	2.9	3.8	2.9	2.13	2.5	2.3
Penn world tables						
1951-1960		**1961-1970**	**1971-1980**	**1981-1990**	**1991-2000**	**2001-2008**
I	1.1	3.6	0.4	-0.3	1.5	2.6
II	1.6	3.0	1.2	0.4	1.7	5.9
III	3.7	3.5	2.5	1.8	3.3	6.3
IV	3.4	4.5	3.8	1.2	2.7	5.9
V	2.8	4.3	3.9	2.2	4.0	2.9

Source: author's elaboration with data from The Maddison Project (2013) and feenstra *et al.* (2015). R package 3.3.

Finally, in this section, we describe the stable composition of the top fifth quintile. Table 2 lists the countries that have integrated the top fifth quintile and the number of frequencies in that quintile from 1950 to 2008. It is easy to appreciate the following tendencies in this top quintile:

1) Only European countries, the US, Canada, and Japan have constituted this group for the past 40 years- in fact, these countries have been considered the most advanced since 1850 (Pritchett, 1998);[8]

[8] The advanced countries in 1950 were Italy, Germany, the US, France, Japan, Belgium, the UK, Austria, Finland, Sweden, Denmark, the Netherlands, Switzerland, Canada, Australia, and Norway.

2) Countries that previously were in this group, such as Venezuela, Argentina, and Uruguay, have been left out since the arrival of the neoliberalism;
3) Some high oil exporters can join the group on special occasions, as in the case of Oman, Gabon (this situation would also be the case for Kuwait, the Arab Emirates, etc.),
4) Countries such as Japan, Israel, South Korea, Singapore, and Taiwan were upgraded from the lower quintiles to the top. We have mentioned before that upgrading is possible due to capital accumulation. In turn, capital accumulation is due to the state and special conditions in the World-System.

TABLE 2
Top quintile countries from 1950 to 2008 based on real GDP per capita

Maddison							
Country	**Times country**		**Times country**		**Times country**		**Ti**
South Korea	16	Equatorial Guinea	5	Finland	49	Canada	59
Spain	39	France	55	Sweden	59	Australia	59
Italy	49	Japan	46	Denmark	59	Ireland	29
Germany	54	Belgium	58	Netherlands	59	Singapore	29
Taiwan	20	UK	59	Switzerland	59	Portugal	15
T&Tobago	34	Austria	49			Norway	57
USA	59	Hong Kong	32	Venezuela	34	Argentina	18
Israel	44	Uruguay	3	Greece	22	Gabon	6
Penn world tables							
Country	**Times country**			**Times country**		**Times country**	**Ti**
South Korea	14	Equatorial Guinea	1	Finland	51	Canada	59
Spain	44	France	57	Sweden	59	Australia	59
Italy	49	Japan	45	Denmark	59	Ireland	39
Germany	54	Belgium	58	Netherlands	59	Singapore	30
Taiwan	23	UK	59	Switzerland	59	Portugal	1
T&Tobago	29	Austria	52	Seychelles	10	Norway	59
USA	59	Hong	38	Venezuela	4	Uruguay	5
Israel	47	Russia	3	Greece	34	Gabon	4
Oman	10	Algeria	2				

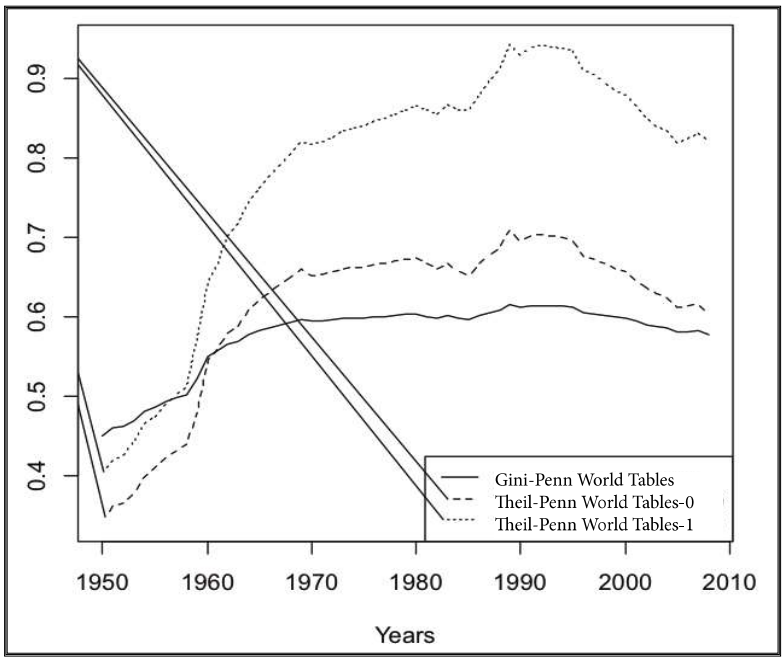
Source: author's elaboration with data from the Maddison Project (2013) and Feenstra *et al.* (2015). R package.

4. INEQUALITY BETWEEN COUNTRIES AND CAPITAL ACCUMULATION

After revising the evolution of inequality throughout the world from 1950 to 2008, we proceed to review the following:

1) Inequality between countries in the levels of the stock of capital per capita occurring in the world;
2) Accumulation, in general, is carried out more quickly in countries with high levels of stock of capital per capita than in countries with low levels of stock of capital per capita;
3) The top fifth quintile at levels of stock of capital per capita is stable and does not present many entrances and exits;
4) Real GDP per capita is highly correlated with the stock of capital.

Figure 3 plots inequality between countries of the stock of capital per capita. As mentioned, during the 1960s, inequality increased, from the 1970s to the mid-1980s, inequality was stagnant with a little increase to the end of the 1990s; and finally, from 2000 onward, inequality decreased (figure 3). Discounting the 1950s whose increased inequality was due to the newcomers in the sample, from the 1960s onward inequality between countries increased globally. The correlation between indexes of GDP per capita and the stock of capital per capita is 0.88%, 0.84%, and 0.86% for the Gini, Theil-0, and Theil-1 indexes respectively.



Source: author's elaboration with data from feenstra *et al.* (2015). R package 3.3.

FIGURE 3
Gini and theil coefficients of inequality of real stock of capital per capita

Table 3 shows growth rates of real stock of capital per capita divided by share of income at the quintile level from 1951 to 2008. Similar to the trend in the growth rates of GDP per capita, growth rates of the stock of capital per capita follow a stable hierarchy. Usually, the top quantile accumulates faster than the other quantiles. As it is clear to see, the bottom quantile usually accumulates at a slow pace. Only in years of the 2000s were all the quantiles accumulating faster than the top fifth quantile. This neatly resembles Wallerstein's assertion that core countries and some special areas in specific decades concentrate the global accumulation of capital. Also, table 3 shows the problems Third World Countries face in financing their own investments. The bourgeoisie in poor countries is weak, and the state is also weak, with all external loans ending up being a heavy burden. Even in countries such as Mexico and Brazil that attempted to catch up the leading countries from the 1940s to 1990s, although the states were strong, they were unable to finance their own investments, and so contracted loans and ended up in default. Through the 1980s and 1990s, these countries transferred a massive amount of resources to core countries, thereby impoverishing their

own economies. Table 4 depicts the top quintile countries from 1950 to 2008 based on the real stock of capital per capita. European countries, the US, Canada, and Australia are the countries with greater frequencies in the table. Japan is a country that upgrades from the bottom to the top, and another remarkable case was South Korea, which from the lowest quintile achieved the top of the fourth quintile in 2008.

TABLE 3
Growth rates of real stock of capital per capita divided by quintiles

1951-1960		1961-1970	1971-1980	1981-1990	1991-2000	2001-2008
I	0.5	-0.09	4.0	0.9	4.8	6.4
II	-0.5	1.3	4.3	0.2	4.3	8.5
III	1.5	1.6	4.9	2.8	3.9	9.4
IV	2.9	2.9	5.2	3.0	4.6	7.2
V	4.1	4.7	5.7	2.7	3.3	5.8

Source: author's elaboration with data from feenstra *et al.* (2015). R package 3.3.

TABLE 4
Top quintile countries from 1950 to 2008 based on real stock of capital per capita

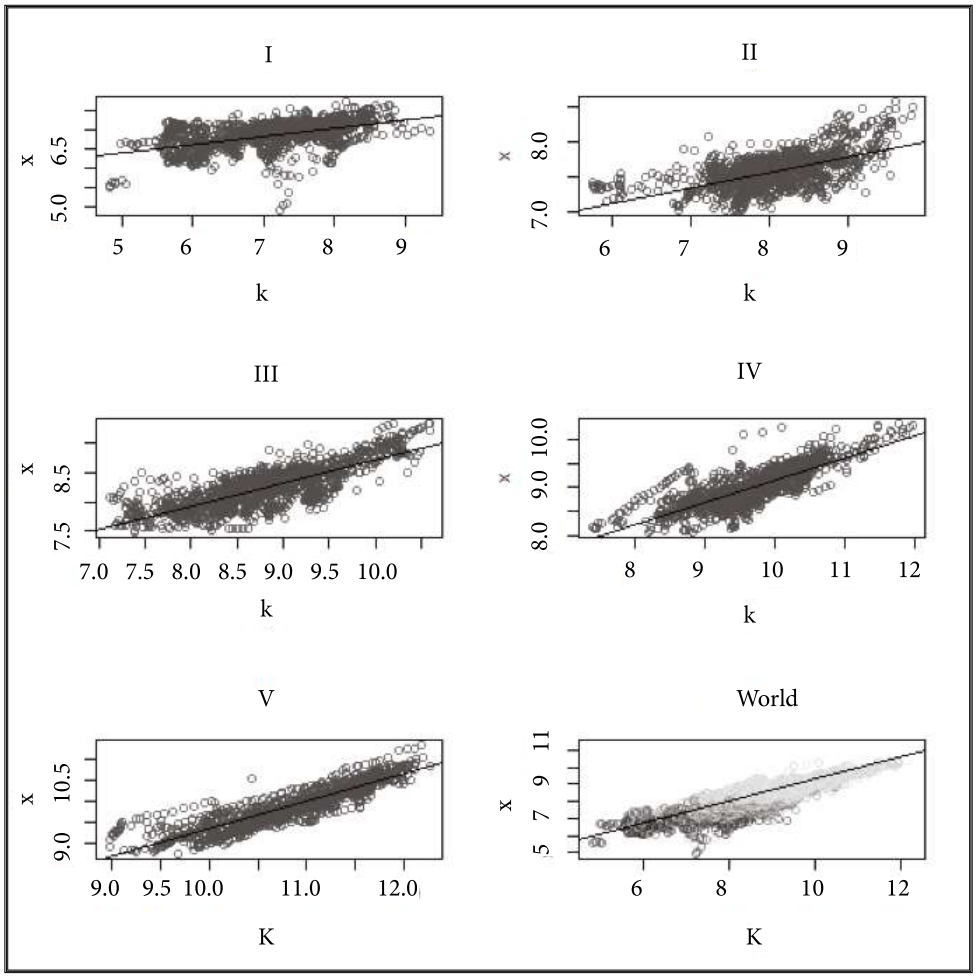
Country	**Times country**		**Times country**		**Times country**		**Ti**
Russia	6	Algeria	12	Finland	54	Australia	59
Spain	44	France	57	Sweden	59	Ireland	44
Italy	49	Japan	43	Denmark	58	Singapore	35
Germany	55	Belgium	59	Netherlands	34	Portugal	34
Taiwan	2	UK	59	Switzerland	59	Norway	59
Seychelles	12	Austria	49	Canada	59	Oman	3
USA	59	Hong Kong	21	Venezuela	25	South Korea	5
Israel	47	Greece	49				

Source: Author's elaboration with data from feenstra *et al.* (2015). R package 3.3.

Finally, we show that a key determinant of convergence is the levels of the stock of capital and the rate of accumulation. Figure 4 relates real GDP per capita (x) and the real stock of capital per capita (k) by quintile and world total in scatter plots, with GDP per capita the dependent variable. The correlation is 0.53 in the first quintile, 0.60 in the second, 0.80 in the third, 0.81 in the

fourth, and 0.90 in the fifth quintile. Even though the five plots show a linear tendency, in the first two the correlation is not so impressive. However, after adding all the quintiles in one plot, we can see that each quintile is a layer where real GDP per capita is strongly correlated to the stock of capital per capita, with a coefficient of correlation of 0.92. In figure 4, the plot titled "World" shows the relation between the two variables with each quintile in a gray scale: the bottom quintiles are the darkest and the top quintiles are the lightest.

Almost all neoclassical scholars have included the stock of capital per capita in their models; however, for them, the stock of capital per capita is



Source: Author's elaboration with data from Feenstra *et al.* (2015). R package 3.3.

FIGURE 4
Real GDP per capita (x) and the real stock of capital per capita (k) by quintile and world total

not the most important factor. For Solow (1956, 1988), the most important factor is total factor productivity, which is explained by neither labor nor capital. After Solow, many neoclassical scholars have tried to find the most important factor contributing to growth. For Becker (1990) and Lucas (1988), this factor is human capital; for Romer (1986,1990,1994), it is endogenous technological change; and for Engerman, Sokoloff, Urquiola and Acemoglu (2002), the important factors are land, population and labor force. Then, the strong association between the GDP per capita and the stock of capital per capita can be presented as a conclusive finding.

5. CONCLUSIONS

In this article, we addressed the following:

1) Unweighted between-countries inequality in the world increased from 1950 to 2008 and especially from 1960 onward. Throughout the 1980s and the early 1990s, inequality increased drastically, as measured by several indexes, and declined during the 2000s;
2) There is a strong relationship between the levels of real GDP per capita and the stock of capital per capita, and investment in poorer countries does not increase faster that investment in richer countries;
3) There is a stable hierarchy among top income countries,
4) Growth rates depend on capital accumulation, and the accumulation of capital depends on the state.

Finally, for poor countries to grow and catch up the leading countries, they need a huge investment effort led by the state. This effort may be realized only through a global concertation or through regional planning. Also, to accumulate capital, poor countries need the existence of some historical facts such as the minimum payment of external debt or the remittances of profits to home countries.

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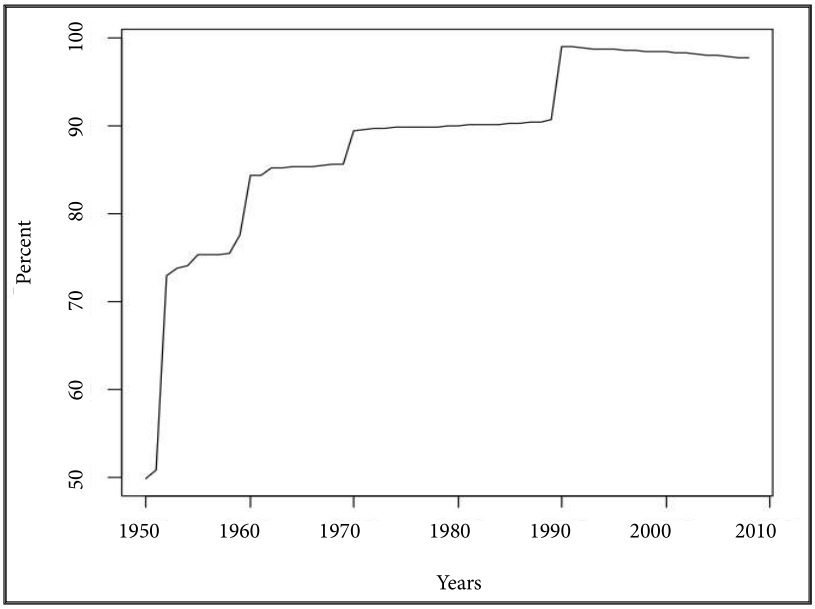
Appendix. Table 1A

Africa	America	Asia	Europe	Oceania
Algeria	Argentina	Bangladesh	Albania	Australia
Angola	Brazil	Burma	Austria	
Benin	Bolivia	Cambodia	Belgium	
Botswana	Canada	China	Bulgaria	
Burkina Faso	Chile	Hong Kong	Denmark	
Burundi	Colombia	India	Finland	
Cameroon	Costa Rica	Indonesia	France	
Cape Verde	Dominican Rep	Iran	Germany	
Chad	Ecuador	Iraq	Greece	
Comoro Islands	El Salvador	Israel	Hungary	
Congo Brazzaville	Guatemala	Jordan	Ireland	
Côte d'Ivoire	Honduras	Japan	Italy	
Djibouti	Jamaica	Laos	Netherlands	
Egypt	Mexico	Malaysia	Norway	
Equatorial Guinea	Nicaragua	Mongolia	Poland	
Gabon	Panama	Nepal	PortugaL	
Gambia	Paraguay	Oman	Romania	
Ghana	T.Tobago	Pakistan	Russia	
Guinea	Uruguay	Philippines	Spain	
Guinea Bissau	USA	South Korea	Sweden	
Kenya	Venezuela	Singapore	Switzerland	
Lesotho	Peru	Sri Lanka	UK	
Liberia		Syria		
Madagascar		Taiwan		
Malawi		Thailand		
Mali		Turkey		
Mauritania		Vietnam		
Mauritius		Yemen		
Morocco				
Mozambique				
Namibia				
Niger				
Nigeria				

Table 1A. Conclusion

Africa	America	Asia	Europe	Oceania
Rwanda				
Senegal				
Seychelles				
Sierra Leone				
South Africa				
Sudan				
Swaziland				
Tanzania				
Togo				
Tunisia				
Uganda				
West Bank Gaza				
Zaire				
Zambia				
Zimbabwe				



Source: Author's elaboration with data from The Maddison Project (2013) and Penn World tables (2015). R package 3.3.

FIGURE 1A
World's population total covered in our sample