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July 2017
Working Paper 23/2017
Department of Economics
The New School for Social Research

CAPITAL ACCUMULATION IN THE CENTER AND THE PERIPHERY ALONG THE NEOLIBERAL PERIOD. A COMPARATIVE ANALYSIS OF THE UNITED STATES, SPAIN AND BRAZIL

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Abstract

This paper presents a comparative analysis of the process of capital accumulation in three economies, US, Spain and Brazil, between 1990 and 2014. The objective is to analyze the peculiarities existing in these cases, corresponding to the main contemporary economy (US), a developed one, but with a peripheral integration into a more developed área, such as the Euroarea (Spain), and a semiperipheral economy (Brazil); and in a period in which, specially for both Spain and Brazil, a neoliberal turn is carried out, and achieving certain monetary stalibity that ultimately affect the macroeconomic performance.

JEL: E11, E22, F00, O47, O5

Keywords: capital accumulation, productivity, profit rate, underdevelopment

Table of contents

INTRODUCTION

This paper presents a comparative analysis of the process of capital accumulation in three economies, United States (US), Spain (SPA) and Brazil (BRA), between 1990 and 2014, a period in which a neoliberal program is introduced, and from a political economy perspective. This comparison will address a number of specific issues, mainly: i) the absolute levels and evolution of the general rate of profit, as well as the interest rates; ii) the composition and dynamics of investment, surplus and output; and iii) the determinants of profitability: the capital-output ratio, productivity and relative prices.

These three economies have a different degree of economic development. During this period, per capita GDP in US$ at 2010 constant prices in Spain represents between 59% and 65% of the US level, while in Brazil it barely reaches 19-21% (World Bank, 2017). This sample allows to address the particularities of capital valorization in heterogeneous countries of the center-periphery schema, which allegedly belong to the advanced center of the world economy (US), the periphery of a developed area (Spain), and the semiperiphery (Brazil).

The period chosen is explained, first, by statistical availability. In Brazil, only since 1990 there is a disaggregation of the System of National Accounts (SNA) which makes posible to exclude certain unproductive activities (IBGE, several years). And second, because of the purpose of studying the restructuring of the accumulation process in a context of neoliberal policies, albeit not with a great change for the US economy, since after 1990 i) in Brazil there is a phase of monetary instability in terms of inflation, exchange rates and debt, that culminates with the implementation of the neoliberal Real Plan; and ii) in Spain, the period starts with the end of the expansionary cycle (1985-91) leading to the crisis of 1992-93 and the subsequent implementation of a neoliberal program to meet the convergence requirements set in the Maastricht Treaty.

The research is based on a political economy approach, that is, in the last instance, that of Marx´s labor theory of value. The object of study is particularly relevant because it requires to analitically advance in the abstract scheme of the process of capital accumulation, as to take into account what can be claimed (simplifying), a center-periphery schema, and in a period in which less developed economies lead economic growth (see IMF, 2016). In fact, Brazil has had an average growth higher than the US and Spain since 1990: even in per capita terms, average growth amounted to 1.65%

until 2014, while 1.4% in US and 1.15% in Spain (World Bank, 2017). Although it is not intended that the results could be extensible to all the advanced and backward economies, it aims at least to promote comparative analysis of the particularities of center-periphery capital accumulation dynamics following a Marxist approach (still generally focused in one economy, and in most cases developed, given the availability of databases).

The study begins with a theoretical section in which the categories of analysis are explained, as well as the fundamental features of capital accumulation in the center and the periphery, and later, reference is made to the countries analyzed in the current historical context (1990-2014). In the next section, empirical results are exposed: first, addresing the different categories of the accumulation process; and then, from the different phases of growth, slowdown and crisis, ending with an annex on the comparative tendency of productivity.

THEORETICAL ASPECTS

Categories and concepts

From the labor theory of value (LTV), which addresses capitalist production as a process of valorization (Marx, 1867), the following causality has to be the starting point: [SP, r → I, K → Y], where SP: surplus, r: profit rate, I: investment, K: stock of capital; Y: output (new value). Thus, the capacity to generate surplus explains the productive investment of a part of that profits, in turn driving economic growth.

One of the implications of the LTV for the measure of these economic categories is, on the one hand, the separation of the capitalist and non-capitalist sectors, and on the other, the delimitation of productive activities ($_p$) within the capitalist sphere, with the purpose of establishing the productive labor (PL).[1] In this paper, a simple method is carried out: finance and real estate (FIRE) and government and social services (GOV) are considered unproductive (UPL), so they are deduced in the calculations. However, it has

[1] This perspective differs from the dominant approach within Marxist economics, set out by Shaikh and Tonak (1994), which starts from the concept of production, and then proceeds to separate the specifically capitalist from the non-capitalist. See Mateo (2007) for the debate on productive and unproductive labor.

not been posible to exclude the non-capitalist activity of self-employees because of statistical difficulties, especially in the cases of Spain and Brazil.[2]

Gross operating surplus (GOS), or just profit (P), is the difference between GDP and wages (W), P = GDP – W. When making reference to SP, profit is then taken from the productive capitalist sphere, so $SP = P_{tot} - P_{FIRE} - P_{GOV} = \sum(GDP - W)_{PL}$. The mass of SP at constant prices (SP*) is calculated in relation to the gross investment price index (P_{inv}), following Shaikh (2016),[3] since it is the purchasing power of money-capital in terms of capital assets it can purchase what turns out to be relevant in the analysis of valorization: $SP^* = SV/P_{inv}$. The measure of the capital stock correspond to the end of year t-1, in net terms, excluding residential assets (nr), but for the economy as a whole, so if not specified otherwise, $K = K_{net,nr}\ (t-1)$. Therefore, the rate of profit is expressed at current prices as follows:

$$r = \frac{SP}{K}$$

As the purpose of capitalist production is to generate surplus, the development of the productive forces is expressed in the capacity to generate surplus per unit of labor time in a sustained way along time. Thus, the profit rate is associated with the level of productive development and, by extension, affects the determination of the cost of financing (i). The interest rate has thus an objective foundation in the productive sphere, together with the economic cycle (Shaikh, 2016). Therefore, it is possible as well to claim that K → r → (i, r − i). That is, there is a reciprocal relationship between profitability and capital, since the level and structure of capital as a social relationship constitutes a fundamental determinant of the profit rate, and in turn, the level of profit explains the flow of investment (GFCF), materialized in 'K'. This capital stock is made up of machinery and equipment (M&E), construction (CONS) and other assets (OTH). Thus, the profitability of capital can be discomposed in terms of the capital-output ratio (θ), and the profit-share (δ):

[2] In the case of FIRE activities, apart from the fact that they include a higher-than-average part of unproductive activity, non-theoretical aspects, such as the problem of tax accounting, have to be considered (see Bichler and Nitzan, 2012, Hudson, 2012), as well as the speculative booms, as in Spain (Mateo and Montanyà, 2017).

[3] See the section "Methodological questions" at the end of this paper.

$$r = \frac{\theta}{\delta}$$

The capital-output ratio, at current prices, can be broken down into the same ratio at constant prices $(K/Y)^*$ and the price ratio of capital stock and output (P_{ky}).

$$\theta = \frac{K^*}{Y^*} \cdot \frac{P_k}{P_y} = \left(\frac{K}{Y}\right)^* P_{ky}$$

The profit share is the profit to output ratio, and is directly associated with the rate of exploitation (e), so when 'e' goes up, so 'δ' does:

$$\delta = \frac{1}{1 + (1/e)}$$

In order to address profitability, explanatory priority is given to the 'θ' ratio. The process of accumulation has a tendency to increase this capital-output ratio, the basic mechanism to increase the profit-share. To the extent that it increases labor productivity (q), being $q = (Y^*/L)_p$, where L is labor, production costs will be reduced, so that θ → q → δ. Also, this ratio represents the inverse of the maximum rate of profit, since if W = 0, then $r = 1/\theta$.

Once exposed the accumulation process under the abstraction of both capital and labor in general, the following section incorporates the more concrete center-periphery dichotomy of the capitalist system.

Accumulation of capital in the center and the periphery

In order to advance in the degree of concreteness of the analysis, a simplified model can be considered in which country A represents the developed area (the center), issuing the currency ($) that performs the function of reserve of value at world level. Country B would represent a peripheral, undeveloped economy, that may have an industrial activity as a part of the internacionalization of production (semiperiphery), or being just an economy dependent on primary activities.

A differentiating element between A and B is *capital*, indeed the real *entry point* of the analysis. Its level, technological content and structure by assets, they all represent to a great extent the level of productive development. For this reason, the average level of productivity, expressed in the same currency ($), will be higher in A, so that $(q_A > q_B)^{\$}$.

However, the rate of profit (r), in gross terms, is expected to be higher in country B: $r_B > r_A$.

The unequal productive development is manifested in the type of external insertion. Given the lower valorization capacity, the process of capital accumulation in country B has a qualitatively different dependence on external factors (see Astarita, 2010), which is why exchange rates (ER, and in real terms, REER) do play an important role in its dynamics of accumulation. The ER expresses the conditions in which domestic socially necessary labor time is transformed into abstract world labor. For this reason, exchange rate parity expresses the position of the different national capitals, and in turn that of the country, in international competition (Milios and Sotiropoulos, 2009; Shaikh 2016). The greater productive development leads to a pressure towards the appreciation of the ER, meaning a greater capacity to acquire labor time (Carchedi, 1997).[4] The currency of country A also enjoys a secured demand by its reserve currency role, the security and liquidity of its financial system, and therefore tends to appreciate in real terms even more, which in turn is supported (but also contributes to) greater monetary stability.[5]

However, the way by which this affects the weight of investment in the total product incorporates heterogeneous elements. On the one hand, the higher capacity of valorization (and development), monetary stability and the lower cost of financing in country A actually encourages long-term investment. At the same time, imports of inputs and consumer goods are cheapened with the outsorcing of production, reducing the relative cost of investment, and thus the cost of worker's reproduction (Panitch and Gindin, 2009; Smith, 2010; Milberg and Winkler, 2009), which could be manifested in a lower increase in investment in real terms (Beitel, 2009), so depending on the context, the economy B could reach a greater investment dynamism, so

$$\left(\frac{I}{Y}\right)_A < or > \left(\frac{I}{Y}\right)_B$$

Alternatively, the exchange rate of peripheral countries (B) tends to be above the exchange rate that theoretically corresponds to their purchasing power parity (PPP),

[4] From which a critic to the widespread use of PPP statistics does consistently follow (see Freeman, 2009; Smith, 2010).

[5] Briefly, it should be taken into account that monetary stability is not a neutral or technical idea, but an essential requirement for the operation of the law of value, the comparison of labor time and its social validation by the market. It is as well present in economic asymmetries and power relations.

which is explained by the general backwardness of the country's productive forces (Astarita, 2010). There is in turn a pressure towards higher inflation in these economies, so that $\dot{P}_A < \dot{P}_B$. By extension, there could be an asymmetry between the rates of change of their relative prices because of the dependence on imports of capital goods by country B, $\left(\dot{P}_k > \dot{P}_y\right)_B$, that is, a higher $\dot{P}$ and a pressure towards the increase of $P_{ky} = P_k/P_y$. In fact, the monetary sphere and relative prices are essential because "the ability to purchase these [capital] goods determines a country's ability to *develop*" (Smith, 2010: 194), hence the "successful attainment in the sphere of consumption in fact depends on prior success in production" (Freeman, 2009: 1441).

There is an objective foundation in the productive development for a more than proportional increase in interest rates in the periphery ($i_B >> i_A$), which in turn should contribute to monetary stability, and are influenced by inflation, the exchange rate, or the demand for international reserves (Astarita, 2010: Paiceira, 2009), as well as the need for financing.[6] Thus, the net profit rate of interest in the economy B, or the so-called net profit rate of enterprise ($r - i$), is eroded. It has to be considered, therefore, that although $r_B > r_A$, the gap is correspondingly reduced when some other factors such as interest rates, and the progressive depreciation of the exchange rate, which establishes the purchasing power in world currency of the surplus generated in the backward country, are incorporated. That is, country A has wider possibilities to counteract the downward trend in profitability (see Mateo, 2016b), since the greater purchasing power of its currency could compensate for a deterioration in the rate of profit.

These aspects are reflected in the capital-output ratio, an essential indicator of the degree of productive development. At first instance, it is expected that $\theta_A > \theta_B$. However, a number of reasons (country B´s dependence on imports (mainly) of capital goods, the impact of the exchange rate) may lead to a lack of correspondence between the absolute level of this ratio and the labor productivity, pushing for a relative increase of θ_B, as well as for a countercyclical movement when ER depreciates after crises in backward countries.[7]

[6] It is possible to make reference to the central economy´s (US) arbitrage: "borrowing short term at low interest rates from foreigners, lending back to long term at higher returns" (Schwartz, 2009).
[7] See this relatoinship for Mexico in Mateo (2007) and for Peru in Weeks (1985). Valle y Martínez (2013:183) claim that the "value composition in industries using imported means of production is higher

The lower competitiveness of firms in B, together with the aforementioned processes, do influence the pattern of income distribution: an additional ressure towards a higher profit share (rate of exploitation), and a lower real wage in world currency $(wr)^{\$}$, with a greater industrial reserve army that regulates wage fluctuations. Therefore, although the rate of exploitation (e) must be higher as the productive development advances (Milios and Sotiropoulos, 2009), there are as well opposing factors that tend to substantially increase the profit share in country B, associated to wage moderation.

Finally, it is necessary to consider that the tendency towards uneven development and polarization exists not only during the periods of accumulation, but also, and fundamentally, they are even intensified during economic crises (see Gowan, 1999). At these junctures the role of finance is decisive for carrying out the crisis-specific function of restoring profitability: capital movements in search of safe assets in A, which pushes towards a greater depreciation of B´s currency, and its increase in the risk premium, greatly enlarging the cost of financing gap between the center and the periphery. These depreciations cheapen the costs of country A´s imports, and rise the cost of international currency-denominated debt in backward economies. Consequently, this process generates the conditions for a process of acute centralization of capital, thus strengthening the most powerful capitals, associated with their territorial-geographical dimension. However, this polarizing dynamics admits different nuances, and does not have to be strictly in line with national boundaries.

Case studies within the framework of neoliberal restructuring

The period of analysis, which begins in 1990, is part of the neoliberal-inspired restructuring initiated in the 1980s (Mateo, 2016a). Briefly, for the purposes of this paper, the outsourcing of certain parts of the production process, the increase of the global reserve army and the rise of finance (see Foster et al., 2011; Milberg and Winkler 2009) should be highlighted. Thus, the pressure to contain the composition of capital in the current phase of capitalism stands out (Freeman, 2004).

Following the implementation of structural adjustment programs along the 1980s in undeveloped economies, especially in Latin America, since 1990s (and mainly 2000s)

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than the corresponding value composition of the same industries in countries with higher productivity," becuase of the fact that "the price system establishes the value of an imported commodity according to national values and thus more work is necessary to purchase it."

economic growth rates have become higher in the periphery,[8] albeit with a reprimarization process of Latin American economies, such as Brazil (ECLAC, 2010). One of the achievements of these adjustment programs has been the greater monetary stability, which affects the theoretical framework discussed above. While inflation averaged 81.6% per year in developing economies in 1980s (158% in Latin America), and less than 6% in developed ones, in the period 1990-15 average inflation falls in the periphery to 26% (41% in L. America), and 2.4% in the center, and even in the 2000s it averaged 7% in Latin America, and almost 2% in the developed areas (UNCTAD 2017). Alternatively, a significant erosion of the US hegemonic position has been observed (see Bichler and Nitzan, 2012), although it still accounts for a quarter of world GDP in current dollars in this period (IMF, 2016).

The case studies should be analytically located in this historical context, for which the most relevant aspects of the Spanish and Brazilian economies are briefly mentioned.[9] Thus, there is a significant economic restructuring in both Spain and Brazil following the import-substitution industrialization strategies that collapse in the mid-1970s and 1980s, respectively, supported by high rates of profit, albeit obviously in different contexts (see Charnock *et al*, 2014, Mateo and Montanyà, 2017). In Spain, the application of the neoliberal program intensified after the 1992-93 recession and the sign of the Maastricht Treaty, in order to prepare the economic integration into the Eurozone. This process culminated with the adoption of the Euro in 2002, although exchange parity had already been fixed in 1999. Brazil also initiated changes in the 1980s, but the deep neoliberal turn took place mainly from the 1990s. After a period of high inflation and indebtedness, the Real Plan is implemented in 1993-94, a program following the IMF guidelines that managed to stabilize inflation, and substituing the domestinc currency, the cruceiro, for the new real (reais).[10]

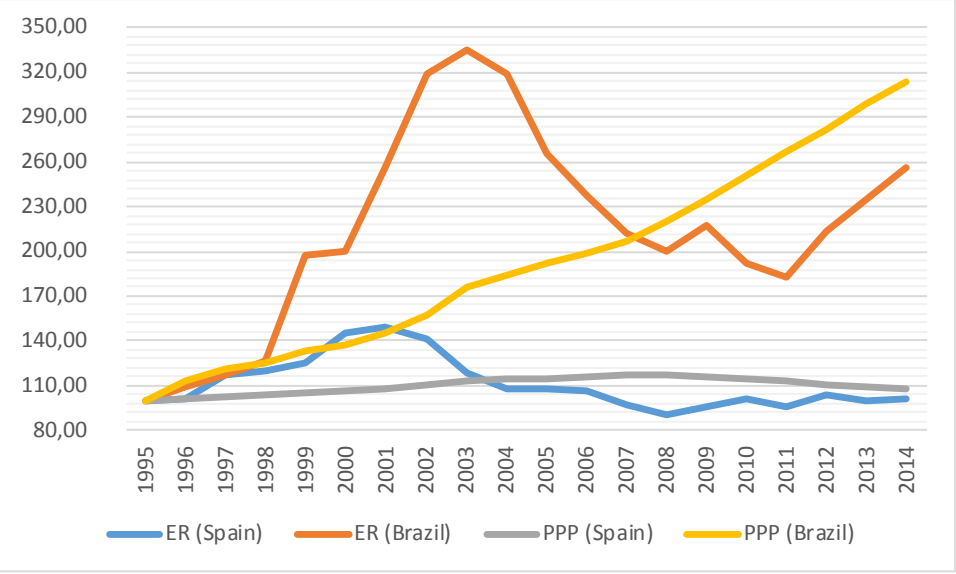
These two economies shared one common fact: the level of the rate of profit in 1990 was relatively low in relation to previous decades, with a markedly downward trend, unlike US. In Spain, it was 20.2% below the average of the 1965-74 growth phase, and

[8] In 2005constant dollars, advanced economies grew at 1.94% per annum in 1990-15, compared to 5.18% in developing economies (UNCTAD 2017). As a result, the advanced areas´ GDP, even based on PPP share of world total, fell sharply from 63% between 1980 and 1991 to 41% in 2016, although the share of Latin America also declined, from 10% in the early 1990s to 7.8% in 2016 (IMF, 2016).
[9] As the US economy is widely known, see Beitel (2009), Bakir (2015) and Kliman (2011).
[10] Due to high inflation in the first half of the 1990s, some calculations for the Brazilian economy in this paper are presented starting in 1995.

barely 1% higher than the average of the 1980s, while the profit rate in Brazil in 1990 was 60% lower tan the average of 1965-79, and 22% below the 1980s average level. On the other hand, profitability in the US started an ascending phase from the minimum of 1982, so in 1990 the level was similar to the average of 1983-89.[11]

Spain's nominal parity against the dollar depreciates by 82% between 1990 and 2001, but with the Euro and the economic expansion, it is appreciated 39% until the crisis erupts in 2008, followed by a certain subsequent depreciation (see Fig. 1). Brazil experienced significant currency depreciations in the first half of the 1990s (over 1000% between 1992 and 1994), but from 1995 to 2003, the annual depreciation rate is limited to 16%, then beginning a phase of appreciation between 2003 and 2008. In both cases, the nominal ER is appreciated in relation to the PPP index, since 2003 in Spain and since 2007 in Brazil.

Graph 1. Market exchange rates and implied PPP conversion rate (1995= 100)



Source. IMF (2016, 2017), OECD (2017)

However, the REER[12] is appreciated in Brazil until 2003, subsequently depreciating to the same level as in the early 1990s, while the REER in Spain and the US show more stability. In relation to the US, and considering the period as a whole, inflation in Spain increases by 7% more than the nominal ER against the US$, while in Brazil, relative

[11] In Spain: net operating surplus (NOS) (AMECO, 2017) (year t); $K_{net,nr}$ (t-1) (FBBVA, 2017); for Brazil: GOS, $K_{gross,nr}$ (t) (Mateo, 2017b); and for the US: NOS, $K_{net,nr}$ (t-1) (Mateo, 2016b).
[12] In this case, reference is made to the REER calculated by the IMF (2017) based on the consumer price index (CPI) against a weighted average of several foreign currencies.

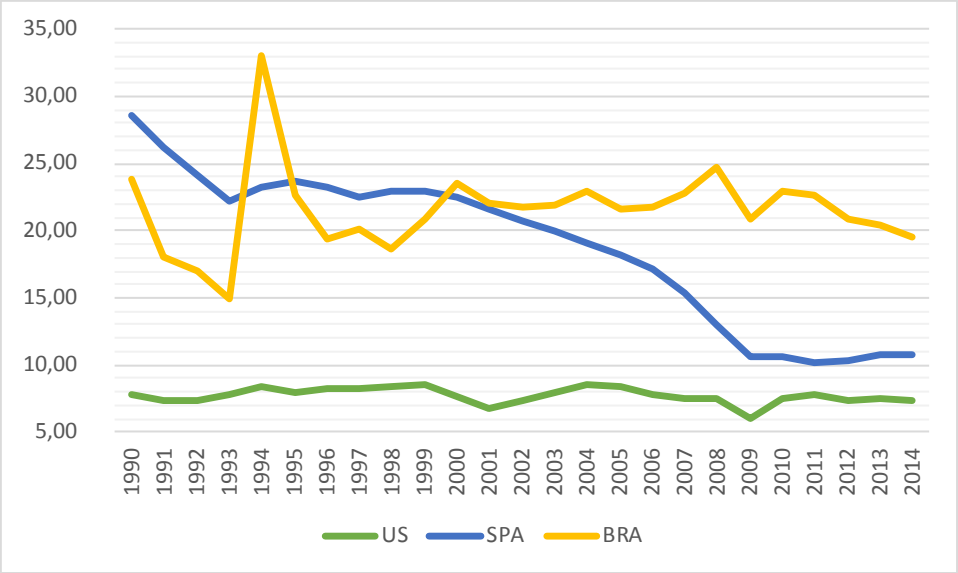
inflation grows slightly above exchange depreciation, 2.8 times compared to 2.3 of the latter. Therefore, if only the period after monetary stabilization is considered, the specific aspect in Brazil is the lower inflation gap with the Spanish and US economies, as well as a greater stability of the exchange rate that avoids a progressive depreciation in real terms in relation to the US. In the case of Spain, its integration into the Eurozone implies having an extremely appreciated exchange rate, which affects the housing boom, that in turn drove its dynamics of accumulation.

COMPARATIVE OF THE CAPITAL ACCUMULATION PROCESS

Capital profitability

In the US and Brazil, the profit rate shows a steady evolution, with the exception of the great oscillations during the first years of Brazil´s hyperinflation, such as the peak in 1993-95, only understandable within that monetary disorder (Fig. 2). If in the US it barely falls by 5%, the profit rate in Brazil drops by 17.8%. In the Spanish economy, on the other hand, profitability has fallen more than 60% until the subperiod 2009-14. Therefore, although the general profit rate in Spain was higher than Brazil until 2004-05, in 2014 is already 30% lower. Since the Great Recession, thus, the comparison in absolute terms corresponds more to the level of development: the average in 2008-14 is 7.28% (US), 13.88% (SPA) and 21.70% (BRA), that is, in proportions with respect to US of 1.9 and 2.9 to 1 for Spain and Brazil, respectively.

Graph 2. The general profit rate (%)



Source. AMECO (2017), BEA (2017), EU-KLEMS (2011), FBBVA (2017), IBGE, IPEA (2017), Morandi (2015), NSI (2016).

The net profit rate of enterprise is substantially different, and mainly in Brazil, since interest rates are disproportionately high in relation to both US, and Spain after joining the Eurozone (Table 1). Thus, the interest rates gap between US (but Spain as well) and Brazil exceeds the gross profit differential, although it must be considered that this last economy is one of the few where the short-term rate has been higher than the long-term rate.

Table 1. Main interest rates of reference (%)

	Discount rate			Money Market Rate			Treasury Bill Rate			Long term rates		
Year	US	SPA	BRA	US	SPA	BRA	US	SPA	BRA	US	SPA	BRA
1990	6,98	14,61		8,10	14,76	15.778,57	7,51	14,17		8,55	14,68	
1991	5,45	13,11		5,69	13,20	847,54	5,41	12,45		7,86	12,36	
1992	3,25	12,83		3,52	13,01	1.574,28	3,46	12,44		7,01	11,69	
1993	3,00	11,19		3,02	12,33	3.284,44	3,02	10,53		5,87	10,21	
1994	3,60	7,71		4,20	7,81	4.820,64	4,27	8,11		7,08	10,00	
1995	5,21	8,83		5,84	8,98	53,37	5,51	9,79	49,93	6,58	11,27	23,39
1996	5,02	7,48	25,49	5,30	7,65	27,45	5,02	7,23	25,73	6,44	8,74	16,06
1997	5,00	5,35	27,57	5,46	5,49	25,00	5,07	5,02	24,79	6,35	6,40	10,13
1998	4,92	4,25	37,72	5,35	4,34	29,50	4,82	3,79	28,57	5,26	4,83	11,67
1999	4,62	3,83	29,08	4,97	2,72	26,26	4,66	3,01	26,39	5,64	4,73	13,22
2000	5,73	5,06	19,94	6,24	4,11	17,59	5,84	4,61	18,51	6,03	5,53	10,75
2001	3,41	5,23	19,82	3,89	4,36	17,47	3,45	3,92	20,06	5,02	5,12	9,50
2002	1,17	4,21	23,59	1,67	3,28	19,11	1,61	3,34	19,43	4,61	4,96	9,88
2003	2,10	3,25	30,77	1,13	2,31	23,37	1,01	2,21	22,10	4,02	4,12	11,50
2004	2,40	3,00	23,22	1,35	2,04	16,24	1,37	2,17	17,14	4,27	4,10	9,81
2005	4,25	3,02	26,27	3,21	2,09	19,12	3,15	2,19	18,76	4,29	3,39	9,75
2006	6,02	3,94	22,19	4,96	2,83	15,28	4,72	3,26	14,38	4,79	3,79	7,88
2007	5,79	4,94	18,70	5,02	3,85	11,98	4,41	4,07	11,50	4,63	4,31	6,38
2008	2,17	4,73	19,10	1,93	3,85	12,36	1,46	3,71	13,68	3,67	4,37	6,25
2009	0,50	2,06	16,67	0,16	0,68	10,06	0,16	1,00	9,70	3,26	3,98	6,13
2010	0,73	1,75	16,39	0,18	0,45	9,80	0,13	1,69	10,93	3,21	4,25	6,00
2011	0,75	2,00	18,36	0,10	1,02	11,66	0,06	3,04	11,66	2,79	5,44	6,00
2012	0,75	1,63	14,98	0,14	0,27	8,48	0,09	2,66	8,07	1,80	5,85	5,75
2013	0,75	1,13	14,67	0,11	0,15	8,18	0,06	1,17	8,99	2,35	4,56	5,00
2014	0,75	0,51	17,51	0,09	0,12	10,86	0,04	0,39	11,54	2,54	2,72	5,00

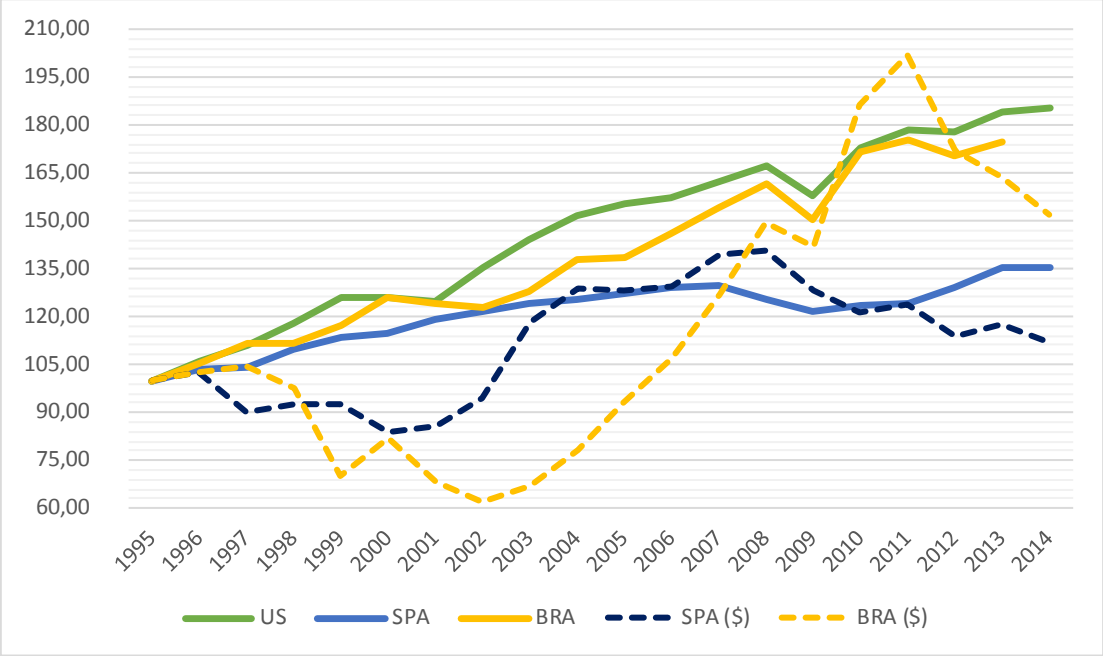
Notes. The discount rate in Spain: 1990-98 (Spain), 1999-14 (Euroarea); long term rates in Brazil: government bonds (BNDES).
Source. BNDES (2017), Federal Reserve Bank of St. Louis (2017), IMF (2017), OECD (2017).

It is nonetheless necessary to specify i) the capacity of US not only to increase the (r – i) differential through a low interest rate, but also, together with Spain during the economic boom, with low risk premiums (2-3%) in relation to Brazil (from 37-57% in 1997-2003 to 20-37% up to 2014) (IMF, 2017), which enable its companies to invest abroad, thus achieving higher profit rates and leading to an inflow of surpluses (Panitch and Gindin, 2009; Schwartz, 2009); ii) the (to a great extent) exogenous nature of interest rates in Spain, which first contributed to the housing boom until 2007, and then, after the outbreak of the crisis, produced an extraordinary increase in the risk premium during the last crisis (see Mateo, 2017c); iii) the functionality of high interest rates in Brazil to keep exchange rate stability and moderate inflation. But in order to support long-term investments, Brazil has The National Bank for Economic and Social Development (BNDES), with a specific line of credit for acquire capital goods at a lower interest rate, as shown in the last column of table 2.

The production of surplus at constant prices reveals different results. If the first half of the nineties is excluded, the path of the volume of surplus is quite similar in both US

and Brazil, slightly higher in the first case, 84% Vs 74% of accumulated variation in 1995-13. In contrast, Spain´s surplus stagnated since 2000s, showing an overall increase of only 35%.[13]

Graph 3. Dynamics of the mass of surplus in domestic currency and US$ (1995= 100)



Note. For domestic currency, the surplus is deflacted by the domestic gross fixed capital formation price index, and for the surplus denominated in US$, it is converted with market exchange rates and deflacted by the P_{inv} of the US.
Source. BEA (2017), EU-KLEMS (2011), FBBVA (2017), IBGE, IMF (2017), IPEA (2017), Morandi (2015), OECD (2017)

The valorization process in the US$ shows a more volatile trajectory in the cases of both Spain and Brazil (Fig. 3), clearly marked by the integration into the Eurozone and the boom of commodities in 2000s, respectively. The generation of surplus (US$) in Brazil shows an extraordinary growth between 2003 and 2011, when it was multiplied by 3 times. As for Spain, the period of increase is actually reduced to 2000-08, when it grows at 6.7% per year, but then falls by 20%. Globally, the surplus value in US$ produced in Brazil increased by 62% in 1995-13, 20 percentage points below US, and 11 points

[13] However, there are certain aspects to take into account, as the results are altered not only because of the Brazilian monetary instability of 1990-95, but also according to the price deflator used. P_k and P_{inv} substancially differs in the US, so if P_k (t) is taken, the increase in the total mass of surplus generated falls by a half (40.48%), and if the average of years t and t-1 is used (P_k, [t/t-1]), then the rise in the quantity of surplus produced in Brazil drops to only 40%. Although there are changes as well in the case of Spain, they are far too smaller, as its surplus increases by 24-27% and 35% with P_k (t; t/t-1) and P_{inv} indices, respectively.

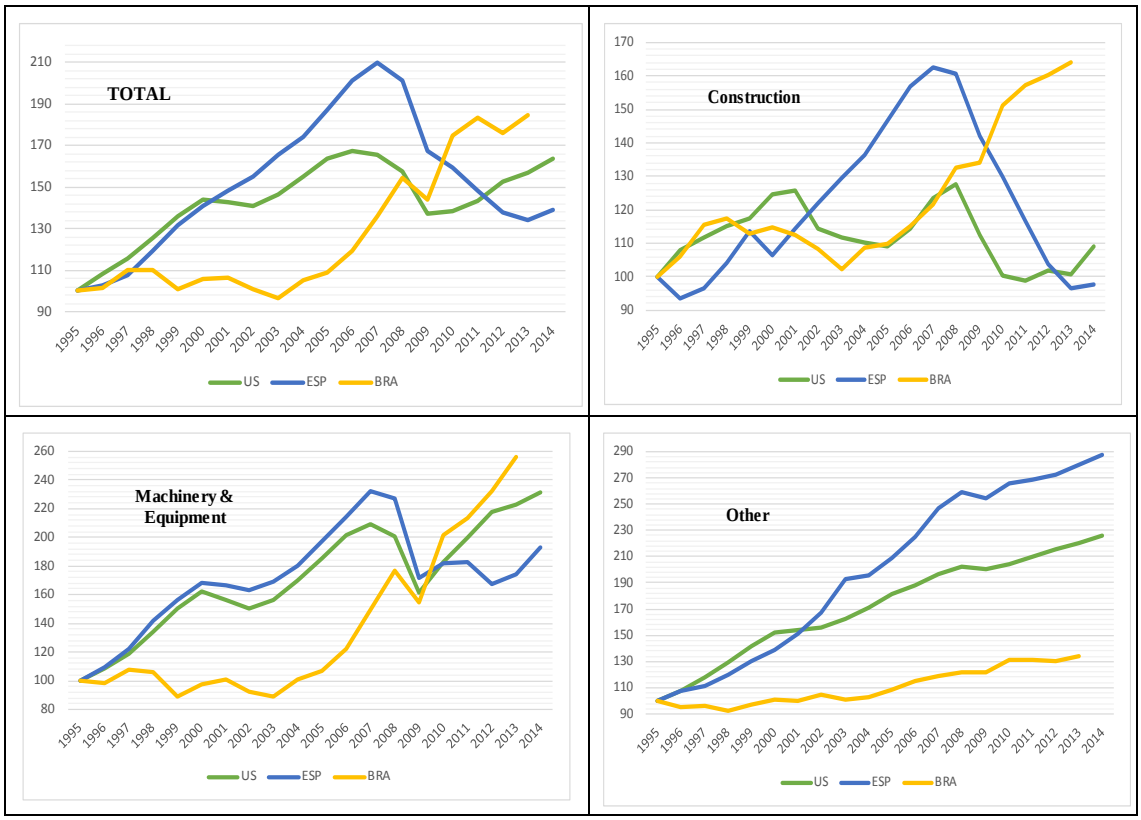
below the mass in domestic currency. For Spain, the result in US$ became worse than in domestic currency by 18 points, widening the gap with the other economies. Therefore, even with the monetary stability and the appreciation of their currencies achieved, at the end both Spain and Brazil´s production of surplus in US$ laggs behind.

Investment, capital-output ratio and productivity

The composition of investment (GFCF) by assets shows some contrasts in these countries. Brazil is the economy with the highest percentage of investment (current prices) in M&E, with more than 40% since 1995, and since 2006 it exceeds 50% of total investment. It fluctuates around 25-30% in Spain, while in the US it only represents 20-25%. In terms of investment in construction assets, it accounts for a larger share in Spain, as could be expected due to the housing boom of the 2000s, being higher than 60% of the total (including residential) up to the outbreak of the crisis, when it sinks to 50% in 2014. In the US it is 54-58% until the Great Recession, as well with a post-crisis fall, while in Brazil is generally less than 50% since 1995. Finally, US stands out for the greater percentage of investment in other assets (intellectual property), which represents 20-25%, well above Spain and Brazil´s levels (6-7%).

At constant prices, graph 4 shows the dynamics of the volumen, with two distinct cycles in the three cases: before and after the outbreak of the Great Recession in the US and Spain, and 2003 as a turning point in Brazil. Investment in the US is characterized by a sustained increase in all assets with the exception of construction. Conversely, volatility is higher in the other countries, since investment in Spain accelerates relatively from 2000 onwards, but the crisis is also on a greater scale, leading to a deep collapse of accumulation. Although GFCF in construction assets stands out in its evolution during both the boom and the subsequent fall, it should be noted that the volume of investment in M&E evolves in a similar way to US until the last crisis. In the case of Brazil, GFCF stagnates up to 2003, followed by a subsequent boom except in other assets and culminating with an accumulated increase higher than the other economies.

Graph 4. Comparative path of gross investment at constant prices and its components (1995= 100)



Note. Gross investment in construction in Brazil includes residential assets, unlike US and Spain.
Source. BEA (2017), FBBVA (2017), IPEA (2017)

Globally, total investment grew 56% and 34% in the US and Spain until 2013, respectively (77% and 41% for non-residential), and almost 85% in Brazil. However, despite this increase in investment in Brazil, which in any case is limited to the period after 2003, its relative level of GFCF to GDP is substantially lower than the other economies (see table 3 in the next section). Between 1996 and 2007, the GFCF to GDP ratio only reaches 15-17%, with a slight rebound later, and only in 1990 and 1994 it reaches 20%. This level is higher in Spain, but so its volatility, with a maximum of 31% of GDP in 2006-07, although it subsequently collapses even below 20%, while in the US it is relatively constant around 20%. However, if residential investment is deducted, the percentages of gross investment relative to GDP are very similar in Spain and US, and about 3-5 points lower in Brazil.

GFCF flows nevertheless lead to higher average net capital accumulation rates in Spain (3.9%), above 2.3% and 2.1% corresponding to the US and Brazil, respectively. In the first case, as of 2009, the accumulation rate nearly collapses, while in the US, the

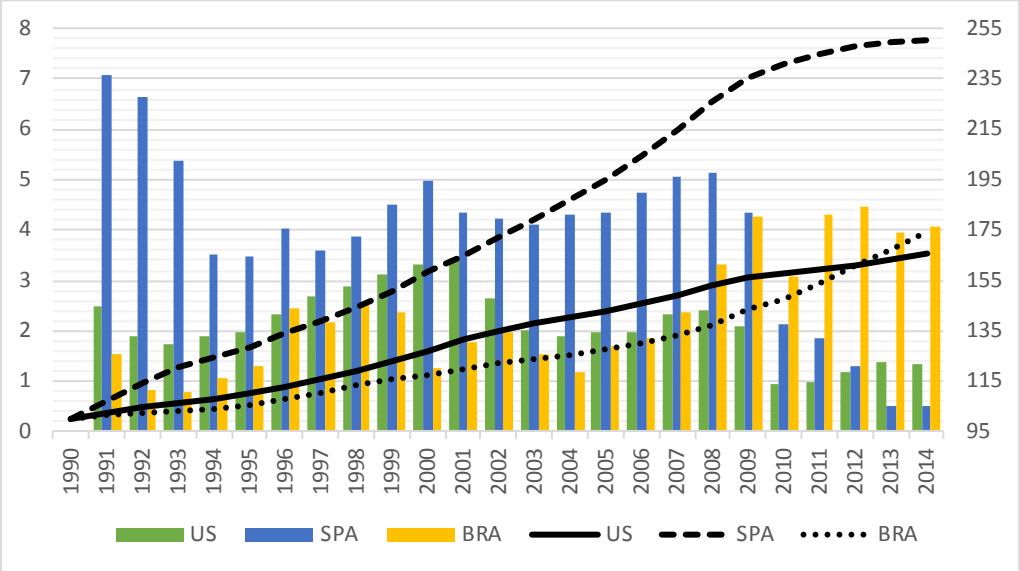
expansion of K* is superior to Brazil until the outbreak of the Great Recession, when precisely it does accelerates in this one over 3% per year. And from this path of accumulation, the level and dynamics of the capital-output ratio (θ) can be now addressed. First, the absolute level is only partially related to the degree of productive development. Although in the US it has the highest level, only after 2009 this ratio turns out to be higher in Spain tan in Brazil, now displaying an apparent relationship with the level of development, so $US_{\theta} > SPA_{\theta} > BRA_{\theta}$. However, the differentials of 'θ' are too small in relation to the level of development. Between 1996 and 2005, the ratio in Brazil exceeds 90% of the level in the US, and between 1992 and 2007 it exceeds 80%, although from 2004-05 onwards it falls relatively. In the case of Spain, there is a trend towards convergence, reaching more than 80% of the US ratio as of 2011. Also, it is noteworthy that only in this country there is a clear upward trend of K/Y, for in the US is only weakly visible between 2000 and 2009, and in Brazil it has remained relatively constant since 1995.

Behind this evolution, a particular dynamics of this ratio at constant prices (K/Y)* and price deflators (P_{ky}) can be found. Only in Spain does the volume of the capital stock grows at a faster rate than the output, although this happens after 2000, but with an increase slightly above 50%. This path is ilustrative of the inefficiency associated to the housing boom that fueled the process of capital accumulation. On the other hand, the P_{ky} ratio reveals a peculiar evolution, since it increases until 2012-14 almost 20% in US, and hardly 3-4% in Spain until 2010-14. As for Brazil, it is true that P_{ky} increases by 51% between 1990 and 2013, but since 1995 there is a striking stability. Moreover, after a rise until 2005, it is followed by a remarkable drop of 13% up to 2013, so that the total increase in 1995-13 is less than 10%.[14]

[14] The moderated path of the P_{ky} ratio represents an extraordinary change of trend in the Brazilian economy, as it has historically been highlighted by the relative price increase of capital stock, even in relation to other developing economies (see IEDI 2007, Mateo 2017b). However, these data require some caution, as the P_{inv}/P_Y ratio shows a different evolution, mainly in the US and Brazil.

Graph 5. Rates of capital accumulation and the stock of capital at constant prices

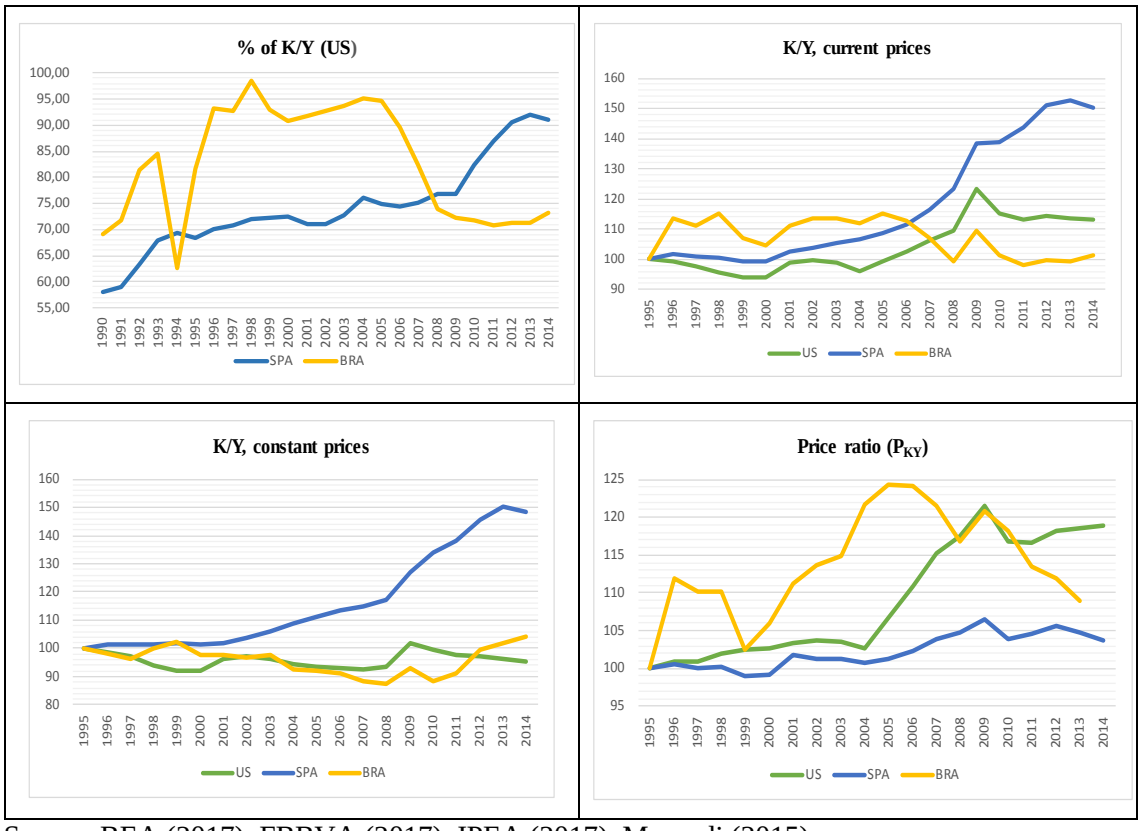
Annual rates of increase of the capital stock (%, left axis) and evolution of the stock of capital (1990= 100, right axis)



Source. BEA (2017), FBBVA (2017), IPEA (2017), Morandi (2015)

Graph 6. Comparison of the capital-output ratio and its determinants

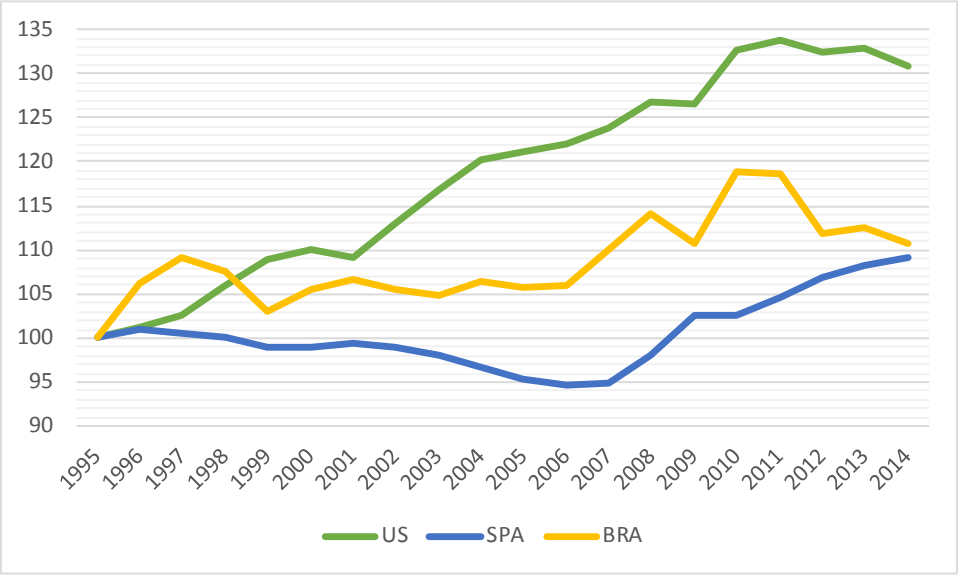
Absolute levels as a percentage of US (1990-14); evolution of K/Y at current prices, constant prices (K/Y)* and the relative price ratio (P_{ky}) (1995-14; 1995= 100)



Source. BEA (2017), FBBVA (2017), IPEA (2017), Morandi (2015)

The result of technical change is productivity, which in the US since 1995 grows by 30%, three times that of Spain and Brazil (9% and 10%, respectively) (Fig. 6).[15] In addition, productivity in the US is progressing steadily, with the exception of the stagnation in the last four years, while in Brazil productivity does no actually rise significantly until 2007-08 and 2010, then surprisingly descending 7% until 2014.[16] On the other hand, Spain experiences a clearly differentiated evolution in three phases with a countercyclical character, as shown in the next section (Table 3).

Graph 7. Labor productivity (1995= 100)



Source. BEA (2017), IBGE, IPEA (2017), Marquetti and Porsse (2014), NSI (2016), EU-KLEMS (2011)

Summarizing, i) in US, it has to be highlighted the stability of investment and productivity, and thus the efficiency of investment in terms of (K/Y)* despite the increase of P_{ky}; ii) there is a great increase in rate of capital accumulation in Spain, but inefficiently in terms of productivity and relative prices, which raises K/Y and, in addition, generates a contradictory evolution of the variables following the crisis of 2008 (only explained by sectoral restructuring, as shown in Mateo, 2017a); iii) and in Brazil there is a high level of volatility: stagnation of investment up to 2003 and a

[15] Data of productivity from the IBGE series used is misleading in 1990-95, showing an outstanding rise in Brazil (17.8%) that is not coherent with other series such as GGDC (2007) (only 1.2%).
[16] On the other hand, the measure of productivity of the total economy also increases the differential in favor of the US, and in Spain it advances more than Brazil. Thus, the cumulative increases from 1990 would be 42.9% (US), 28.2% (Spain) and 19.8% (Brazil). As a result, the exclusion of unproductive sectors reduces in relative terms the rate of productivity growth in the US.

subsequent rise which, paradoxically, is not related with productivity, while the decline of P_{ky} since 2005 contributes to stabilize the K/Y ratio.

Phases of growth and crisis

This section addresses the comparative process of accumulation based on cycles of growth, recession and intermediate periods that I call slowdown, characterized by some instability, slow growth or stagnation (Table 3). The number of years of economic growth is similar, 14 in the US and Spain, and 15 for Brazil, although distributed differently. Brazil has had an anual average GDP growth of 3.15%, greater than US (2.44%) and Spain (only 1.97% per year). This gap is enlarged when taking the new value (Y), slightly rising the Brazilian average to 3.21%, while reducing that of the US (2.36%) and, especially, in Spain (1.48%). Crises, on the other hand, differ by quantity (one in US, two in Spain and three in Brazil) as well as in number of years (only two in the US, five in Brazil and seven in Spain), but the slowdown phases affect more to the US (7 years), and then Brazil (4 years).[17]

In this sense, macroeconomic variables generally offer lower volatility in US. Precisely, an underlying aspect of this dynamics is monetary stability. Inflation is lower as higher the level of development, and even ignoring the early 1990s, Brazil's average inflation since 1995 is almost four times higher than US. However, Brazil has achieved an outstanding moderate inflation in historical terms, even though the counterpart has been high interest rates. In the case of Spain, the adoption of the euro represents an important change, from a relatively inflationary crisis in 1992-93 (more than 5% a year) to the recent Great Recession with barely 0.59% of price rise per annum.

Thus, cyclical oscillations in the production of surplus (SP*) are deeper as lower the productive development. In the US economy, it only declines in the 2008-09 recession, although the rate of increase during expansions is less than 3%. As it was shown, this instability is amplified in dollars for Brazil and Spain, with a procyclical character due to the incidence on the exchange rates.[18]

[17] However, the crisis of 2009 in Brazil has led to a dichotomy between the evolution of the GDP and the new value (Table 3) in the following years, since the last one is much lower than total GDP, unlike what happened during the recession of 1991-92 and the subsequent upward phase of 1993-97.
[18] In the case of Brazil, the exchange rate explains the apparent paradox of the 1998-99 recession, whose increase in the generation of surplus value in reais results in a 16% annual decline in dollars.

Table 2. Comparative dynamics of the macroeconomic variables

		Annual rates of change								Average	Annual rates of change							Average
	Years	SP*	SP*($)	GFCF*	K*	GDP*	Y*	P*	r	I/GDP	K/Y	(K/Y)*	Pk/Py	e	(Y/L)*	ER	REER	'e'
Growth																		
US	1992-00	2,93	2,93	6,37	2,42	3,84	3,95	1,92	0,72	21,19	-1,23	-1,48	0,40	-0,86	1,44	*	1,50	0,69
	2003-07	1,47	1,47	3,29	2,03	2,87	3,05	2,74	-0,14	22,12	1,22	-0,99	2,32	1,85	1,88	*	-3,57	0,74
SPA	1994-07	2,83	3,47	6,15	4,22	3,60	3,05	3,61	-1,37	25,91	1,04	1,14	0,12	-0,71	-0,16	-0,33	0,50	1,13
BRA	1993-97	13,60	25,16	7,54	1,56	3,98	6,45	313,26	-0,29	18,52	1,52	-4,60	8,71	3,06	4,59	253,49	5,35	1,61
	2004-08	4,82	17,31	9,93	2,09	4,81	4,39	7,12	2,01	17,00	-2,64	-2,21	-0,01	-1,97	1,69	-9,84	9,90	1,91
	2010-14	3,81	3,67	6,42	3,95	4,39	1,65	6,93	0,24	18,78	-2,37	2,26	-2,61	-5,19	0,40	1,90	-0,09	1,46
Slowdown																		
US	2001-02	2,18	2,18	-1,06	3,04	1,38	0,22	1,91	-1,37	21,74	3,13	2,82	0,28	2,88	1,28	*	2,66	0,66
	2010-14	1,86	1,86	3,61	1,17	2,08	2,51	1,71	2,10	18,73	-1,71	-1,30	0,28	0,63	0,66	*	-0,56	0,80
BRA	2000-03	1,14	-0,95	-1,18	1,64	2,35	2,84	9,82	0,24	16,37	1,52	-1,17	3,48	5,06	0,45	14,13	-2,87	1,98
Crisis																		
US	2008-09	-1,62	-1,62	-9,03	2,27	-1,54	-2,61	1,36	-6,95	19,69	7,77	5,00	1,01	0,50	1,05	*	0,20	0,76
SPA	1992-93	0,07	-8,56	-5,98	6,01	-0,06	0,46	5,62	-6,36	22,23	5,41	5,53	-1,71	-2,77	3,80	10,67	-5,77	1,13
	2009-13	-0,58	-2,85	-7,15	2,54	-1,07	-1,97	0,59	-3,77	22,78	4,64	4,60	-0,26	1,44	2,24	0,51	0,09	0,99
BRA	1991-92	-8,50	-18,16	-5,68	1,18	0,28	3,62	642,91	-11,68	18,27	9,30	-2,36	1,43	-8,38	1,39	712,87	-13,97	1,55
	1998-99	2,96	-18,27	-4,35	2,48	0,14	-0,65	6,34	2,80	16,31	-1,79	3,15	-2,27	2,53	-2,87	29,72	-19,62	1,59
	2009	-4,93	-5,11	-6,72	4,29	-0,33	-2,14	7,19	-12,64	18,07	9,94	6,57	1,01	-10,41	-2,82	9,03	-0,76	1,63
Total 1990-14																		
US	1990-14	1,87	1,87	2,72	2,12	2,44	2,36	2,06	-0,18	20,75	0,44	-0,24	0,74	0,45	1,28	*	-0,13	0,73
SPA		1,46	0,44	1,34	3,90	1,97	1,48	2,97	-2,54	24,57	2,33	2,39	-0,17	-0,59	0,86	0,87	-0,20	1,10
BRA		*	5,22	3,37	2,34	3,15	3,21	70,59	-1,07	17,74	0,68	-0,84	1,93	-0,96	1,12	60,03	-0,59	1,69
Total 1995-14																		
US	1995-14	1,72	1,72	2,63	2,15	2,41	2,41	1,96	-0,42	20,91	0,65	-0,25	0,05	0,53	1,42	*	0,08	0,73
SPA		1,21	0,60	1,75	3,57	2,09	1,44	2,34	-3,99	24,88	2,17	2,10	0,96	-0,65	0,46	0,03	0,49	1,08
BRA		*	2,24	3,48	2,67	3,19	2,45	8,15	-0,79	17,31	0,07	0,21	0,09	-1,23	0,54	5,08	-0,12	1,71

Note. Variables with (*), at constant prices; e: rate of exploitation (surplus/wages); P: GDP price index; exchange rates in nominal (ER) and real terms (REER) refers to US$.

Source: BEA (2017), EU-KLEMS (2011), FBBVA (2017), IBGE, IMF (2016, 2017), IPEA (2017), Morandi (2015), NSI (2016), OECD (2017).

The evolution of K/Y in cycles is paradoxical, as there is no clear upward trend during growth phases. While the US managed to reduce it during the 1992-00 boom, this ratio fell in Brazil during the upward phases of 2004-08 and 2010-14, and this ratio in Spain always goes up, but 4-5 times more intensely during crises.

This same ratio but at constant prices [(K/Y)*] also offers different trajectories during the expansionary phases, whereas there is a general increase during recessions, with the exception of the first one in Brazil (1991-92). The price ratio (P_{ky}) tends to increase during periods of growth and slowdown, with the sole exception of Brazil, which stabilizes it in 2004-08 (-0.01% average) and reduces it in 2010-14. For Spain, both factors ([K/Y]*, P_{ky}) pushed the capital-output ratio up during the long expansion of 1994-07, and the price ratio´s fall during recessions can barely offset the increase of (K/Y)*. In a complementary way, the K/Y ratio increases especially in recessions. Though there is an exception in the case of Brazil in 1998-99, it is in this economy where this increase is higher during crises (more then 9% per year), as expected. However, the difference with US is not actually high because of the relative appreciation of the Brazilian currency. One consequence is the contradictory evolution of two variables. On the one hand, the boost to productivity is weak in the growth phases, highlighting the fall (-0.16% per year) during the long boom in the Spanish economy. On the other, the crises-driven sectoral restructurings lead to countercyclical increases in productivity on several occasions in the US, Spain, and in 1991-92 in Brazil.

Another implication is the fall of the rate of exploitation along various phases of growth. Indeed, there is no clear relationship between the dynamics of this variable and the moment of the economic cycle, nor is there a direct relationship between productivity and the rate of exploitation. Therefore, a correlation of these variables with the dynamics of capital profitability is not found. But an inverse link does exist with the level of development, as Brazil has an average rate 2.3 times higher than US, and 1.5 times that of Spain along the whole period. Therefore, i) it is the capital-output ratio that drives profitability, that is, the rise in K/Y makes the profit rate to fall, and viceversa, only with the exception of Brazil in 2000-03; and ii) this preeminence, associated with the above-mentioned relatively high level of K/Y in less productive economies, can be seen in turn in the sphere of distribution as a pressure to increase inequality (rate of exploitaiton, profit-share) in these backward economies.

With the exception of the increase in profitability during the Brazilian recession of 1998-99, the profit rate falls during crises, and to a greater extent in Spain and Brazil. If in the first country the duration of the decrease in the profit rate stands out (1992-93 and 2009-13), in the second case the intensity turns out to be more important, above 10% in 1991-92 and 2009. The relevant aspect is the capacity of both the US and Brazilian economies to push upwards the rate of profit during the growth and slowdown periods of 1992-00 and 2010-14 (US) and 2000-03, 2004-08 and 2010-14 (Brazil), something which Spain has not achieved.

In short, i) in the US economy, there is less volatility and a stronger relationship between the evolution of the volumen of surplus, investment and output, even though the depth of the recession of 2007-09; ii) in Spain, the extraordinary increase in investment is explained by the speculation associated with construction assets, but lacking the capacity to improve productivity and ‘e’, boosting up K/Y and thus pushing down profitability; iii) and in Brazil, despite the recovery of investment from 2003 under an importatn monetary stability, and even preventing K/Y from rising, there has not been a sustancial boost to productivity and the volumen of surplus.

ANNEX. CONVERGENCE OR DIVERGENCE IN PRODUCTIVITY?

Table 4 shows various indicators of the comparative evolution of labor productivity indices in terms of the PPS and market exchange rates for Spain and Brazil as a relative percentage of the US, and as expected, the former being more favorable for these economies. Despite Brazil's better macroeconomic performance in terms of economic growth, it seems that there is no clear trend towards convergence in labor productivity, especially in terms of the exchange rate. As for Spain, the housing boom has generated a long depression that seems to predict a greater divergence, in turn confirmed by The Conference Board and the International Labor Organization (ILO) databases, except for the rebound after the last crisis, as it was claimed, rather explained by sectoral recomposition (Mateo, 2017a).

Table 3. Measures of productivity in Spain and Brazil as a percentage of the US

Measure	Country	1990-94	1995-99	2000-04	2005-09	2010-14	Variation (%)
The Conference Board (2015)							
GDP*/L	SPA	86,31	85,44	77,05	71,97	73,54	-14,79
(2011 PPPs)	BRA	27,60	28,56	25,21	24,64	25,05	-9,27
GDP*/h	SPA	88,46	89,69	79,40	74,00	75,72	-14,40
(2012 PPPs)	BRA	26,48	28,31	25,47	24,60	25,50	-3,70
GDP*/h	SPA	79,16	80,27	71,05	66,22	67,76	-14,40
(2014 ER)	BRA	19,02	20,34	18,30	17,67	18,32	-3,70
ILO							
GDP*/L	SPA	94,32	92,15	81,49	74,65	75,81	-19,62
(2011 PPPs)	BRA	30,39	29,71	26,72	26,48	27,03	-11,06
System of National Accounts (SNA)							
GDP*/L	SPA	66,71	59,05	50,00	65,05	63,19	-5,28
(ER)	BRA	10,50	14,50	7,93	12,66	18,54	76,59
Y*/L (ER)	SPA	69,71	63,07	52,52	65,65	63,98	-8,22
	BRA	7,01	12,76	7,35	11,73	16,33	132,95

Note. Average percentage during subperiods, and variation (%) between 2010-14 and 1990-94, of some measures of productivity: with GDP; 'Y' at constant prices (*); L: persons employed; h: hours worked, at purchasing power parity (PPP) or exchange rates (ER). The section of the SNA correspond to measures of this paper.
Source. BEA (2017), IBGE, ILO (2015), IMF (2017), IPEA (2017), NSI (2016), EU-KLEMS (2011), OECD (2017), The Conference Board (2015)

If the calculations made in this paper from the National Accounts are taken, certain differences can be grasped with the aforementioned databases. First, the productivity gap with the US is higher: more than 30% in the case of Spain and 80% with Brazil, which surpasses 50% in 2000-02 in the first one, and up to 90% in the case of Brazil in 1992-93 and 1999-05. Second, the exclusion of unproductive sectors significantly reduces this gap in Spain until 2006, but extends it in Brazil, although the incidence is reduced over the period. Third, the relative evolution of the differential turns out to be substantially different. The variation in Spain between 1990-94 and 2010-14 is -5% to -8%, roughly half of what both The Conference Board and ILO reveal (-14%), while for Brazil there is an important convergence, to a greater extent in the case of the productive activities. However, these results for Brazil should be qualified by the powerful influence exerted by the exchange rate, and considering that in the last subperiod, relative productivity according to the SNA is still lower (16-18%) than the other ratios (18-25%). There is thus no ground to claim about any trend towards productivity convergence with the US.

CONCLUSIONS

This paper has carried out an analysis of the accumulation process in three economies with different levels of development, US, Spain and Brazil. As expected, the general rate of profit is higher as the level of development is lower, although this has only been achieved since the crisis of 2008-09, as previously the level of gross profitability in Spain had been relatively high. The period is characterized by a relative stability of these profit rates in the US (6-8%) and in Brazil from the second half of 1990s (19-24%). Only in Spain there has been an intense downward trend, exceeding 60% until 2009-14. However, in the latter two cases the level of profitability in 1990 was substantially lower than in previous years. It is also verified that interest rates are proportionally higher in the peripheral economy, Brazil, which erodes the net profit rate of enterprise (r – i), although BNDES performance and the role of interest rates in relation to the control of inflation and the exchange rate have to be considered.

The dynamics of accumulation do not generate the same cycles in these three economies, since in Brazil the fundamental change occurs in 2003, while in the more advanced economies the Great Recession turns out to be more decisive. An essential point is that there is no exact relationship between the relative levels of the categories used, their evolution, the level of productive development and the cycles of growth and crisis. In this regard, the peculiarities of the historical period, characterized by a major restructuring of capitalism worldwide, as well as the monetary stabilization of the mid-1990s in Brazil, along with the incorporation of Spain into the Eurozone, seem to be essential factors for understanding the way that inner tendencies manifest themselves.

This is verified mainly in the capital-output ratio (K/Y) and its determinants ([K/Y] *, P_{ky}). As with the profit rate, it is only after the Great Recession that there is a certain relationship between the relative levels of K/Y and the countries' economic development, being higher in the US and lower in Brazil. However, there are substantial nuances, given the narrow gap between these cases, as well as their relationship with the wide labor productivity gaps still remaining. Its evolution is especially paradoxical, since K/Y tends to increase during recessions rather than expansive phases, hence the link with productivity is weak. However, it should be borne in mind that information on the capacity utilization rate is not included, and that the higher cost of capital assets for backward economies greatly increases their capital-output ratio during crises because of

currency depreciations. Nonetheless, the results clearly show that K/Y is the essential explanatory factor for the dynamics of profitability.

A related, or underlying element, is the monetary sphere (inflation and exchange rates), essential for the working of the law of value, as the social validation of individual labor. There exists a direct relationship with the level of development of the productive forces, as verified by the macroeconomic results of the US economy. Thus, an appreciated exchange rate, low inflation and/or low interest rates do not guarantee by themselves a higher valorization capacity, since in the last instance the monetary sphere is integrated into the process of valorization (the productive sphere). The distortions of the Spanish economy (housing boom, falling productivity) as well as the counterparts in Brazil (high interest rates, slowing productivity growth, etc.) exemplifies this claim. In this sense, it is verified that the semiperipheral economy has a more than proportional rate of inflation, as well as in terms of exchange parity with the US$ and the relative increase of capital goods price index. However, although this is true for the whole period, it is worth mentioning the rise in P_{ky} that occurs in the US since 2004, together with the fall experienced in Brazil from that year. The exchange rate evolution, indeed, is important to explain the small differences in the level of K/Y as well as the valorizatoin capacity in US$, more volatile and with a lower overall results in the Spanish and Brazilian economies, and also the relatively limited rise of K/Y during her crises. These are examples of the form assumed by the contradictions of the capital accumulation process.

Consequently, although the accumulation rate has been higher in these two cases, Spain and Brazil, productivity increases more in US. This reveals a greater efficiency of its investment flows (with more relative weight for other investment assets), and in addition, the differential widens from 1995 onwards, being three times that of Spain and Brazil. Therefore, there is no evidence of a trend towards convergence in productivity, considering that given a certain long-term structural pressure towards the depreciation of less advanced economies' currencies (Brazil), the increase in productivity measured in domestic currency should grow at a higher rate. In this sense, the case of Spain stands out: a long period of growth in 1994-07 driven by the appreciation of residential assets, which has generated an absolutely distorted macroeconomic dynamics in terms of the productive efficiency of the capital stock, the capital stock relative price index, raising

K/Y and thus pushing profitability down, and also preventing both productivity and the rate of exploitation from increasing.

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METHODOLOGICAL QUESTIONS

The measurement of homogeneous variables has forced to rely largely on the statistical availability of Brazil. As there is no sectoral dissagregation for the unproductive activities in both GFCF and K in this economy, the ratios calculated using these variables take GDP instead of Y. Therefore, there is not a full correspondence with other categories when annual rates of change are calculated. GDP price deflators are taken from the IFM (2016), while the exchange rates come from OECD (2017) and IMF (2017) for Spain and Brazil, respectively. For the profit rate, K in year (t-1) is used, except in Brazil in 1990-94, for which average t/t-1 is taken because of high inflation and the corresponding lack of economic meaning of the results.

The main statistical issues for both Spain and Brazil are as follows:

- Spain: the only homogeneous series of the SNA is the NSI (2016) for 1995-15, which is taken as a reference, and linked with EU-KLEMS (2011) in order to distinguish the unproductive activities of income and labor since 1990, while depreciation is calculated from AMECO (2017) as well as GDP before 1995.
- Brazil: the series for Y, W, L come from IBGE; K from IPEA (2017), which runs until 2008. For the following years, it is linked to Morandi (2015), but keeping the structure of IPEA, since the latter is based on 2010 prices. Since there is only information of K at constant prices, the investment price deflator is used to obtain the series K at current prices. For this reason, the same price index is used to calculate the mass of surplus in the three economies. For L, the percentage structure of Marquetti and Porsse (2014) is followed in 1990-99 due to the inconsistencies of the IBGE series. Data of GFCF only reach until 2013, and so the series of the mass of surplus.