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DISTORTIONS AND IMBALANCES IN SPAIN'S ECONOMIC ACCUMULATION DYNAMICS

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Abstract

This paper explores the sectoral distortions in Spain's capital accumulation dynamics between 1999 and 2014 from a political economy standpoint. Investment has been driven in large part by the revaluation of construction-related assets, which has profoundly reshaped the economic structure. As such, it is necessary to conduct a study disaggregated by asset and sector. The crux of the matter is capital composition: the most dynamic sectors display a relatively low technical capital composition, giving rise to an absolute reduction in labor productivity, as well as a price effect that has completely distorted reproduction over time in the Spanish economy.

Keywords: Capital accumulation, economic growth, productivity, investment, political economy.

INTRODUCTION

This paper analyzes the dynamics of capital accumulation in Spain between 1999 and 2014, at the aggregate and sectoral levels, aiming to reveal the main distortions in capital reproduction over time. This analysis shall focus on the period of growth leading up to 2008, which in turn elucidates how the subsequent crisis would play out. From a political economy standpoint, I begin with the hypothesis that capital composition and the capital-labor and capital-product ratios are essential to understanding the sectoral reordering that took place during a time period in which the Spanish economic integration into the Eurozone culminated.[2] Likewise, allusions to distortions or imbalances are not grounded in the notion of economic equilibrium as the normal or conventional situation. Much to the contrary, economic reproduction is profoundly turbulent (Shaikh, 2016), so the idea is to tackle what specifically happened within the realm of normality, which is to say, a lack of equilibrium.

The choice to study the years following 1999 is justified by various reasons which, by extension, reveal why this research is relevant in a heterodox framework. First, analyzing this phase points to the peculiarities of the accumulation process in a context of fixed exchange rates, set in 1999,[3] followed by full monetary integration into an area far more developed in terms of output than Spain (AMECO, 2016).[4] This facet of the situation is important, because it means that the Euro socially validates domestic output to a degree that does not in reality reflect Spain's productive development, because the first driver of any exchange rate for a currency that connects national spaces is relative productivity (Astarita, 2011). Second, this is a time period marked by the underlying problem of profitability, both because the profit rate falls to a historic low and because it declines at a rate faster than that ever seen before in years prior (see Mateo, 2017). Third, the dynamics of accumulation are fueled by a real estate bubble that really begins to inflate at the end of the nineteen-nineties with the enactment of the Land Act of 1998, which reordered the sectoral asset and investment structure. And, finally, the capital stock series kept by the BBVA Foundation database (FBBVA, 2015) ends in 2014 (and associated investment flows in 2013).

This time period runs over two sub-phases, that of growth and that of crisis. Although the former ended in the second half of 2008, the first sub-phase is 1999-2007. Economic growth in this time period (1999-2007) was booming, with average annual gross domestic product and GDP per capita growth rates on the order of 3.77% and 2.27%, respectively, substantially higher than the Eurozone-12 and the European Union-28 (AMECO, 2016). According to the National Statistics Institute (INE) (2015), gross fixed capital formation grew at an average rate of 6.0% annually, faster not only than the GDP, but also than household consumption (3.5%), public spending (5.0%), and exports (4.7%). It was surpassed only by the extraordinary import boom (7.0%), which can be explained by Spain's involvement in the Eurozone. Accordingly, the accumulation process has also quantitatively served as the motor of the Spanish economy, with the caveat that it was driven by the revaluation of construction assets, above all residential properties, which is reflected in the 169% spike in housing prices (Ministerio de Fomento [MF], 2016; Mateo, 2017; Rodríguez and López, 2011). The 2008 economic collapse spurred a long depression from which Spain has not yet fully recovered.[5]

The theoretical framework for this paper is based on Marxist economic policy. Now, I do not set out to empirically estimate Marxist categories, which would require a painstaking reformulation of the System of National Accounts through the lens of productive and non-productive labor (see Shaikh and Tonak, 1994). The reference economic space shall consist of the entirety of the Spanish economy, excluding financial and real estate business, which, in the Spanish National Accounting (CNE, in Spanish) nomenclature are Group K, branches 64-66 (r64-66) "Financial activities and insurance" and L, r68, "Real estate activities," most of which are "imputed real estate rents."[6]

The net non-residential capital stock kept by the FBBVA (2015) is used. The labor (L) index refers to equivalent, wage-earning employment (full-time) (INE, 2015), and, due to statistical difficulties, freelance work is not eliminated.[7]

The topic of analysis is germaine because, moreover, there is a dearth of research on the dynamics of the accumulation process in Spain in this timeframe, particularly from a political economy standpoint. Studies of this latter sort have tended to be more long term, or conducted for the whole of the economy with an emphasis on the dynamics of capital profitability, but without covering the entirety of the current time period (Guerrero, 2006; Cámara, 2007; Nieto, 2006), and more recent studies are centered on income distribution (Boundi, 2014), and structures of ownership and inequality (Murillo, 2015). Looking at the neoclassical economic studies, Mas, Pérez, and Uriel (2006) limit themselves to the

relationship between investment and capital productivity; Mas *et al.* (2013) analyze the time period from 1964 to 2011; and the BdE (2009) is constrained only to several sectoral aspects outside of capital composition.

To aid the reader, this paper begins by outlining the theoretical framework containing the essential aspects of capital accumulation (section II), which will subsequently be employed in the empirical portion. Section III analyzes the results from a macroeconomic standpoint, followed by (IV) the structure of capital assets and principal economic sectors. Finally, I offer my conclusions and delve into certain methodological questions in light of the theoretical framework adopted.

II. THEORETICAL ASPECTS

Capital accumulation refers to the dynamics of capitalist output over time, which is said to generate a surplus (pv) in the form of profit (g). Investment (I) of some portion of the profit is thus explained by the purpose of capital, which is to reduce production costs, in other words, to cheapen the cost of reproduction of the laborer, which entails increasing the margin on wages (W) of the new value created (Y). As such g=Y-W. This investment increases the capital stock (K), so it follows that I=ΔK.[8]

$$k = \frac{\Delta K}{K}$$

The accumulation rate (k) considers the hiring of workers (L), which references two expressions that relate the two variables. On one side, the capital-labor ratio (K/L):

$$\frac{K}{P_K \cdot L} = \frac{K^*}{L}$$

Where K* is the capital stock at constant prices (K/P_k) and P_k is a price deflator. On the other, the annual flow of wages these workers earn can be related to K, which gives rise to the capital-wage ratio, at current prices: K/W. The K/W and K/L ratios are closely related to one another, because they tend to rise with the advent of capital accumulation and the increase in labor productivity, although the capital-wage ratio should grow at a slower pace (Marx, 1867, chap. XXIII).

$$\frac{K}{W} = \frac{K^*}{LW_L} \cdot \frac{P_K}{P_C} = \frac{K^*}{L} \cdot \frac{P_K}{W_L}$$

Where W_L = real wage per worker, P_c = consumer price index, so LW_LP_c is the sum total of wages at current prices (W). The K/W ratio depends, therefore, both on K/L and on the ratio P_k/W_L (briefly, PkW, or K prices with respect to the nominal wage per worker, which according to Wolff (2001):

> indicates how much wages must paid in order to obtain one unit of capital. It is like the average labor content of capital, except in wage terms instead of labor terms. In so far as wages tend to move with overall labor productivity, this term principally reflects the falling amount of labor (both direct and indirect) required to produce one unit of capital (...) An increase in labor productivity will, in turn, cause total (direct plus indirect) labor requirements to decline per unit of capital, and thus the ratio P_k/W to fall (Wolff, 2001: 321)

Therefore, it is to be expected that K/W would grow at a rate below that of K/L, because the mechanization of the production process should reduce the labor per unit of capital requirement, which means that $\Delta K/W < \Delta K/L$.

In turn, the stock of capital is related to the total product, referring back to what Shaikh (1990a) calls the materialized composition of capital, or the (labor) productivity of capital (PK) or the product-capital ratio (Y/K), considering capital as a social relation that includes labor itself (Mohun, 2009). Unlike the capital-wage ratio, this relation is not dependent on the income distribution pattern. Moreover, the amount of capital used to produce Y is a basic driver of the unit costs of fixed capital, which in turn determines fixed capital consumption (González and Mariña, 1992). This category indicates the capacity of the social capitalist relation to generate value, embodied in the total product.

$$PK = \frac{Y}{K} = \frac{\frac{Y^*}{L}}{\frac{K^*}{L}} \cdot \frac{P_Y}{P_K} = \frac{\pi}{K/L} P_{YK}$$

PK depends on the product at constant prices (Y*) per worker (labor productivity, π) with respect to the K/L ratio, as well as the ratio of prices (P_{Yk}= P_Y/P_k). Note that labor productivity and the capital-labor ratio are not independent at all, as it is precisely the increase in the quantity of means of production per worker which does allow for the increasing levels of labor productivity, so K/L → π. The problem is that, gradually, the quantity of capital per worker needed to raise labor productivity increases, implying a fall in the production efficiency of investment [PEI = π / (K/L)], which in turns depresses the product-capital ratio.

$$\frac{\partial \pi}{\partial\left(\frac{K}{L}\right)} < 0$$

If the evolution of productivity is balanced between sectors, the price deflators of both means of production (P_k) and wage-goods (P_c) should be similar to the overall GDP deflator (P_y). Under these conditions, the productivity of capital, which expresses the maximum profitability (with W=0), ultimately depends on the capacity of surplus value-generation achieved with the capital-labor ratio (Shaikh, 1990b). According to the labor theory of value, there is a contradiction in the

need to increase K/L to expand the surplus labor (or margin on wages [π- W_L], and the relative reduction in the foundation of valorization (L), which at the same time explains the tendency toward the relative pauperization of workers, or the relative increase in profit (BR = g/Y).

$$\Delta\left(\frac{K}{L}\right) > \Delta\left(\frac{Y}{L}\right) > \Delta\left(\frac{W}{L}\right)$$

However, as will be shown later, the dynamics of accumulation in Spain during the period studied look nothing like this overall (and abstract) framework. The hallmark of the process was the inflation of assets related to construction, mostly residential, so it is certainly possible to speak of a real estate bubble (Mateo, 2017; Rodríguez and López, 2011), which has led to a series of distortions in the structure of the assets of the stock of capital, reflected in the sectoral configuration, so the change in labor productivity could be tackled in terms of its internal reconfiguration.

$$\frac{Y_T}{L_T} - \frac{Y_0}{L_0} = \sum_j l_{j0}\left(\frac{Y_{jt}}{L_{jt}} - \frac{Y_{j0}}{L_{j0}}\right) + \sum_j \left(L_{jt} - l_{j0}\right)\frac{Y_{j0}}{L_{j0}} +$$

$$\sum_j \left(l_{jt} - l_{j0}\right)\left(\frac{Y_{jt}}{L_{jt}} - \frac{Y_{j0}}{L_{j0}}\right) = \alpha + \beta + \delta$$

Where the rise in productivity, π = Y/L: $[(Y/L)_t - (Y/L)_0]$ during "i" years (from 0 to t) for "j" sectors, and the share of labor in sectoral terms: $l_i = L_j/L$, is disaggregated into three effects (α, β, and δ, each preceded by ∑): *i*) intra-sectoral (α), as if the sectoral structure were to have remained the same (l_{j0}); and inter-sectoral being *ii*) static (β), when resources shift ($l_{jt} - l_{j0}$) to higher-productivity sectors (Y/L_{j0}): and *iii*) dynamic (δ), in this case toward industries where productivity growth rates are higher: $(Y/L)_{jt} - (Y/L)_{j0}$, so $\Delta\pi = \alpha + \beta + \delta$.[9]

III. MACROECONOMIC ANALYSIS

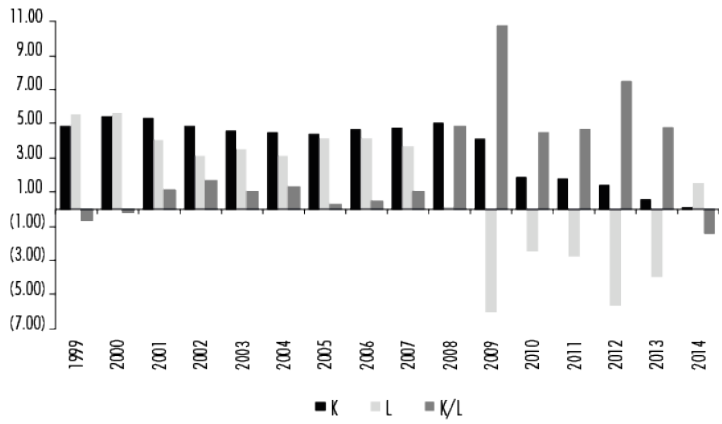
Technical Change and Productivity in Spain

The period between 1999 and 2007 in Spain was characterized by a sharp rate of growth in the net non-residential capital stock, reaching an annual average of 4.8%. However, these dynamics were not capital-intensive, as wage labor grew at a rate of 3.9%. As a result, the mechanization of the production process has evolved in a contradictory fashion, growing at a mere annual rate of 0.8%.

These dynamics shifted radically with the onset of the crisis, because between 2008 and 2014, the capital accumulation rate plummeted (see Figure 1). From growing at a rate of nearly 5% in the run-up to 2007, it dropped to 1.6% annual, and continues on the decline. In reality, the big drop happened in 2010, and in 2014, the stock only went up by 0.07%. As a result, starting in 2008, total and wage employment fell in absolute terms at -3.2% and -3.1%, on average annually, respectively. From a peak in 2008 of 16.624 million wage-earners in the sphere of reference, six years later, there were merely 13.626 million, entailing a drop of -18%. Paradoxically, the K/L ratio increased 5% per year, precisely due to this greater relative decline in the denominator (L).

As such, the behavior of K/L seems certainly anomalous, because in eight years of expansion, it did not even increase 7% in total, and by contrast, it grew 34.3% during the six-year period of depression. This illustrates how volatile employment can be, which at the end of the day, determines the quantitative degree of mechanization. Even so, this anomalous result must take into account that the crisis did lead to a decrease in the usage of installed capacity.[10]

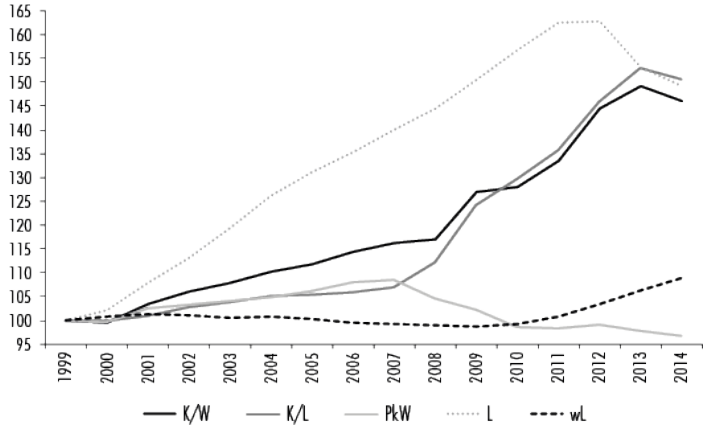
Figure 1. Annual Change Rates of the Capital-Labor Ratio and its Determinants (%)



Notes: stock of capital (K), labor (L), and capital-labor ratio (K/L).
Source: INE (2015) and FBBVA (2015).

The distortion of the accumulation process in Spain also reveals itself in the relationship between the capital-labor and capital-wage ratios (see Figure 2). Until 2007, the increase in the latter was higher by almost 9.2%. The reason is that the PkW parameter, instead of declining as a consequence of productive development, in fact increased 8.6%. In these dynamics, it bears noting that real wages even fell 1.3% up until 2008, in spite of intense growth and a falling unemployment rate, which was curbed by one third, from 15% in 1999 to below 10% between June 2005 and March 2008 (BdE, 2016a). This evolution reveals the labor-intensive character of the process of accumulation, which has not reduced the labor requirements per unit of capital.

Figure 2. Capital-Labor and Capital-Wage Ratios and their Determinants (1999=100)



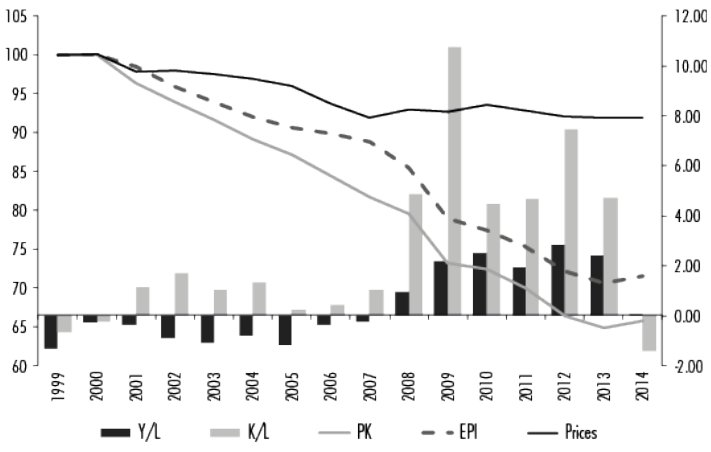
Notes: Labor series (L), real wage per worker (WL) (with the GDP price deflator, because the consumer price index does not really reflect the housing prices boom), capital-labor ratio (K/L) (CTC), capital-wage ratio (K/W) (CVC), and the price deflator of the stock of capital with respect to the nominal wage per worker (PkW).
Source: INE (2015) and FBBVA (2015).

Since the outbreak of the crisis, however, the categories show a profile more in line with what would be expected for a growth phase. The PkW falls nearly -7.3% cumulatively, or -1.2% annually, allowing the K/L ratio to rise more than K/W, so the relative level of both categories compared to 1999 is more favorable to the former (K/L) by nearly 5%.

On another note, the ratio of mechanization depends in large part on the evolution of employment. The labor productivity achieved with investment is influenced by this fact, which in turn affects capital productivity (see Figure 3). First, it is unsurprising that labor productivity exhibits a contradictory path, descending during the expansive phase by -5%, but growing 12.5% during the crisis, with certainly a mediocre overall balance, of a barely 7.8% increase in 15 years. In this time period, moreover, the price deflator of the stock of capital rises relatively with respect to that of GDP by 8.7% in the growth years, and held steady after that, revealing a relative domestic productive lagging and/or the rising price of imported capital assets. Second, the production efficiency of investment (PEI) has always declined in this time period, but to a greater degree in the crisis phase, when the rate reaches -2.9% annually, above the -1.4% in the boom period. Expressed another way, when the degree of mechanization recovers during the crisis phase, even though it is anomalous and contradictory as already mentioned, the drop in the PEI takes off, with a total nosedive of -16.2% in the time period 2008-2014.

To sum it up, not only the labor requirements per unit of capital rise, with a drop in the product-capital ratio, but it all happens in the presence of fixed exchange rates. As such, this situation reveals an underlying problem in domestic production capacity, as well as in the efficiency in the sphere of means of production, related to higher-technology activities.

Figure 3. Product-Capital Ratio and its Determinants,
the Production Efficiency of Investment and the Price Ratio (1999=100)
Base series 1999=100 (left) and annual change rates of Y/L and K/L (right)



Notes: Capital productivity (Y/K) (PK), production efficiency of investment (labor productivity ratio (Y/L) with respect to the capital-labor ratio (K/L), PEI, and the price ratio of product and capital (Pyk), in indices (1999=100). Source: INE (2015) and FBBVA (2015).

IV. DISAGGREGATED ANALYSIS OF THE CAPITAL ACCUMULATION PROCESS

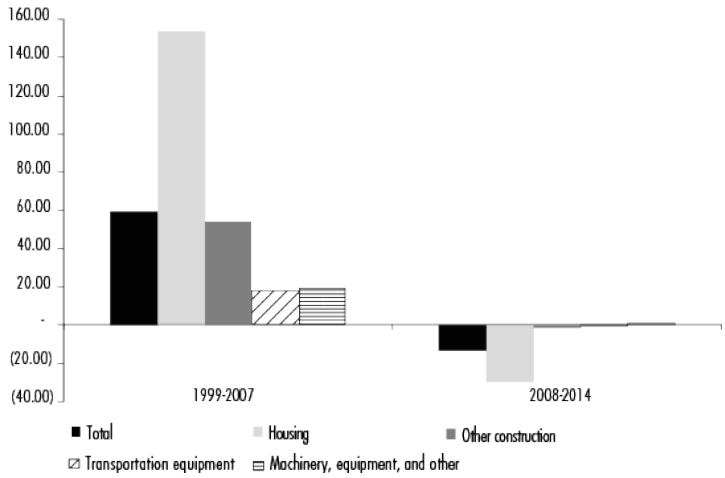
In this section, the accumulation process is approached from the perspective of both the composition of investment by type of asset and the sectoral reconfiguration of the Spanish economy.

Capital Assets

Consideration of the central role of the revalorization of residential assets requires first an analysis of the structure of prices and investment flows by type of capital asset. Figure 4 shows the underlying price effect of this process of accumulation, pointing to a profound dualism between the prices of the assets related to the speculative boom (construction) and the rest. Construction asset prices grew by 153% (housing) and 54.1% (other construction), while the latter group of assets only saw price increases on the order of 17-34%, with exceptions. Later on, the 2008 crisis radically altered this evolution, but not this distorted heterogeneity. The residential asset deflator fell an average of -5.6% per year until 2014, for a total change of -29.5%, and the change for other construction reaching -0.2% annual. I the meantime, machinery- and equipment-related asset prices remained relatively stagnated, reaching peak rates of 1.5% annual increase in 2008-2014.

Residential asset prices are thus very volatile, which is hard to justify in terms of productive development and the amount of labor time socially necessary. In fact, it is likely that there has been some sort of feedback between prices and investment flows. In other words, prices have attracted more investment and, at the same time, investment has driven prices themselves (see Mateo and Montanyà, 2017). This investment distortion is evinced by analyzing its makeup by asset, which reveals that the assets whose prices rose the most were the most dynamic in the accumulation process (see Table 1).[11] Thus, construction-related assets received nearly 70% of the total investment during the boom, and even in the midst of the recession, was still receiving two-thirds, demonstrating the persistence of imbalances.

Figure 4. Price Deflators of Assets in the Stock of Capital (Including Housing)



Source: FBBVA (2015), MF (2016).

By contrast, machinery, equipment and other assets received only 17.1% of the total investment, along with a downward trend, with a loss of 7 percentage points in seven years, going from 22.2 to 15.1% of the total. Investment at constant prices (volume) displays only minor differences, since the average annual growth rate of the former group is 5.4-6.1%, slightly higher than that of the latter (4.3%), but less than investment in intangible assets, which turns out to be the more dynamic (8.2%).

The crisis, at least until 2013-2014, has not yet profoundly reshaped the conditions for capital accumulation, as would expected in light of the share of construction in total investment. However, in terms of volume, the conditions have been reshaped thanks to the profound drop in investment in different construction activities, between -10% and -12% annually until 2013, rates far above those of the rest of the assets.[12]

Table 1. Investment by Type of Asset
Structure of Total Investment and the Annual Change Rates (ACR) (%)

	Total investment		*ACR*	
	1999-2007	*2008-2013*	*1999-2007*	*2008-2013*
Total			5.69	-8.40
1. Housing	38.63	32.06	6.18	-12.32
2. Other construction	31.04	33.46	5.45	-10.29
3. Transportation equipment	8.62	7.67	5.66	-5.53
4. Machinery, equipment, and other assets	17.16	19.50	4.32	-3.14
4.1 Metal products	2.55	2.87	1.92	-5.61
4.2 Mechanical machinery and equipment	6.12	7.24	3.01	-4.68
4.3 Office equipment and hardware	1.92	1.79	12.50	-2.00
5. Intangible assets	4.18	6.79	8.21	2.47

Notes: The FBBVA database only provides investment data to 2013.
Fuente: FBBVA (2015).

Main Activity Sectors

Sectoral restructuring is the other side of the asset-related distortions in Spain's accumulation dynamics. In this process, the price effect has also played a central role. The most noteworthy aspect has been that construction-boom-related sectors have enjoyed a relative increase in their share of GDP, alongside certain services.[13] Table 2 summarizes the sectoral imbalances in the process of capital accumulation, grouping sectors based on their relative capital-labor ratios. First, agriculture, industry, information and communication, and government, with K/L ratios ranging between 116 and 174% of the average of the whole productive economy between 1999 and 2007. They are followed by construction, trade and other, and finance,[14] whose K/L ratios hovered between one-third and 87% of the total.

Table 2. Relative Levels of the Capital-Labor Ratio and Composition of Total Investment by Sector

	K/L: relative level		*Investment in construction*		
	1999	*2007*	*1999*	*2007*	*2013*
Total	-	-	63.39	71.29	56.72
AGR	173.35	170.40	40.43	35.33	33.20
IND	133.63	149.70	43.58	37.21	26.32
INCO	116.39	164.61	36.42	27.72	31.98
GOB	122.03	123.19	75.73	77.00	72.68
CNT	56.88	69.03	74.57	85.36	72.80
CTH	87.12	81.27	50.13	46.96	32.55
FIN	83.27	74.81	-23.20	-35.99	47.12
INM	-	-	99.50	98.78	97.66
PRO	56.29	47.95	39.38	29.86	18.54
OTR	34.88	63.78	64.38	71.59	69.35

Note: Sectoral capital-labor (K/L) ratios with respect to total average and sectoral investment in housing and other types of construction in relation to total investment. The K/L of INM lacks economic significance.

AGR: Agriculture and other; IND: Industry; INCO: Information and communication; GOB: Public administration, health care and education; CNT: Construction; CTH: Commerce, transportation, and hospitals; FIN: Finance; INM: Real estate; PRO: Professional and other; OTR: Other services.

Source: INE (2015) and FBBVA (2015).

There are two nuances that deserve to be mentioned for the data in Table 2. One, the agricultural sector has a greater share of non-wage work, so the capital-labor ratio of the agricultural sector is relatively low to the average. In 1999, the category represented 88%, which rose in 2007-2008 to 105%, to subsequently decline to its original value. Second, information and communication is relatively mechanized in terms of the K/L ratio, but not so in terms of materialized composition (K/Y). The period begins with a relative figure of 66% of the average, rises to 80% in 2006-2008, and oscillates after that but without exceeding that threshold (INE, 2015).

The share of investment in housing and other construction (columns 3 to 5 in Table 2) is to some extent directly related to the level of mechanization, but with several caveats. The relative levels of investment in construction assets in the agriculture, industrial, and information and communication sectors are substantially lower than the average (26-43% of

the total), while government activities, in spite of exhibiting a higher K/L ratio, are construction-investment-intensive, revealing the role of the public sector in the construction boom.[15] Construction and other services are also intensive in this type of asset (64-85% of total investment received), while trade, transportation, and hotels display a share only slightly higher than that of the first group (47-50%), and for professional services, the rate is relatively low.

Sectoral distortions are shown in Table 3. The first aspect worth mentioning is the low level of investment channeled into industrial activities, which did not even get 14% of the total, considering the relative size of this sector.[16] At the same time, 41% of the total flow of investment was directed to construction and real estate. So, about two thirds of total investment, including housing investment, ended up in sectors with relatively low levels of mechanization (K/L). These investment flows have caused a rate of increase in the stock of capital heavily differentiated in these sectoral terms (column 2). Thus, the most dynamic activities in this regard have been generally those with relatively lower levels of of the K/L ratio, with the exception of information and communication. Thus, while the sector in the first group display levels below the average, in the second, the accumulation rate is higher than 5%, and in the case of construction and other services, it even exceeds 10% annual, with the exception of the financial realm.

(SEE TABLE 3)

The hiring of workers in Spain has been even more concentrated than investments, as one-third of wage-earning jobs were created in the sectors of trade, transportation, and hotels, one-fifth in construction, and nearly 18% in professional services, representing slightly more than 70% of total wage-earning jobs created.[17] These three groups of activities have levels below average in mechanization, and of those, only construction increased its K/L ratio, at a rate of 3.3% per year, which resulted in a total increase of nearly 30%. The other sectors that did show a significant increase in the K/L ratio were other services, as well as information and communication, with average annual growth rates of 8.7 and 5.3%, respectively.

There are two elements to emphasize when it comes to mechanization. First, the most dynamic sectors in terms of their accumulation rates are labor intensive, that is, they display relatively low capital-labor ratios, which are usually associated with lower technology content. Second, investment biased towards low-tech activities has not helped to balance out the sectoral structure in terms of the K7L ratio, such that disparities widened throughout the growth phase. Only construction and other services have achieved some convergence, but in this second case, starting from an extremely low level in relative terms, at barely 35% of the average capital-labor ratio in 1999, and 64% of the total in 2007.

In the second part of Table 3 (columns 4 to 7), the relationship between K/L and labor productivity is analyzed. As shown in Section III, the aggregate behavior of the production efficiency of investment was certainly deficient, and at the same time, it hides deep sectoral asymmetries.

i. Only finance achieves an annual increase in "apparent" labor productivity of above 3%. However, this outstanding performance (7.7% annual growth) is indicative, rather, of the amplitude of the bank-funded speculative-housing boom, both for households and non-financial companies, and is therefore more fictitious. In other words, since it is not supported on any surplus generation, therein arises the counterpart in the form of the debt crisis in the Spanish economy and its relative lag in the development of productive forces.

ii. The sectors that did manage to raise labor productivity were industry and information and communications (2-2.3% annual), together with government and agriculture (0.1-0.7% average). Now, several clarifications need to be made:

a. The rise in productivity achieved was in general lower than that of the K/L ratio in the same year. This production efficiency index fell a cumulative -2% in 1999-2007 in public administration, -3.7% in agriculture, 22.2% in information and communication, although industry was only 0.4% of the total;

b. Spanish industry has undergone this restructuring to the benefit of non-tradable activities, so the country has specialized in low-medium-technology content activities (De Juan and López, 2004; García and Tello, 2011; Murillo, 2015). As a result, the relative level of the K7L ratio as compared to other countries in the European Union (EU) (BdE, 2009) has fallen, which is reflected in its relative productivity. Looking at the average of the non-financial realm in Spain, it has gone from 133% in 1999 to 158% in 2014. The share of low- and medium-technology content manufacturing branches in the added value of the overall manufacturing industry is around two-thirds of the total, but only 6-7% in the case of branches with some high-tech component (OCDE, 2016). In terms of the overall economy, high and medium-high-technology manufactures display a very low level, and with a substantial downswing, from 6.4% in 1999 to 4.2% in 2009, not to mention that imports gained a stronger foothold (Gandoy and Álvarez, 2015).[18] Even so, imports of these products represent 56% and 49% of the total, respectively (OCDE, 2016).[19]

iii. Besides the unique case of finance, sectors whose capital-labor ratio is below the average have experienced declining productivity in spite of dynamic investment, with the caveat of other services, whose productivity increased slightly, at a rate of 0.7% annually, during the boom.

As a result of all of the above, the economic sectors on the bottom of the illustration, with less technology content in terms of K/L, received two-thirds of investment (67%), including residential, and generated nearly 80% of total wage-earning jobs (85% in the case of total employment). But, paradoxically, they saw labor productivity decline, between -16 and -25% between 1999 and 2007. There are two exceptions to this trend: *i*) other services, with the lowest K/L level; and *ii*) finance, which, however, is related to the distortions tied into the construction boom.

In terms of the effects on productivity (last three columns), the analysis of the responsibility for stagnated productivity must take into account the sectoral realm. Looking at the economy as a whole, the role of structural change is noteworthy, as δ=-2.89. However, as this reference space narrows to deduct the real estate activities and the financial and real estate realm, the parameter δ moves to be -2.07 and -1.79. In turn, if only the financial sector is taken out, the intra-industrial effect would be substantially less responsible for the poor productivity behavior, as α=-0.29, as compared to values of -1.45 and -1.80 looking at the whole economy, or only excluding real estate, respectively. Likewise, if financial and real estate are ruled out, the static structural effect would also be much less significant, because β=0.53 and 0.87, respectively, rather than β=3.60 for the whole economy. Nevertheless, the justified exclusion of non-productive

activities reveals the double responsibility, symmetrically shared, for the poor behavior of productivity, both due to the evolution of the economic sectors themselves and to the allocation of resources in the Spanish economy.

Moreover, the crisis unleashed in 2007-2008 led to a sectoral reconfiguration, to some degree, although ample distortions persist (see Table 4). The accumulation rate falls to below 2% annually until 2014, and only remains at a high pace for real estate and other services (5.3 and 6.7%, respectively). The consequence of this has been rising unemployment, whose sources are very concentrated. In effect, 85.9% of the drop in wage-earning employment is derived from three activities: one, construction, responsible for 42.9%, as 63.7% of these wage-earning jobs have disappeared, followed by industry and commercial activities, transportation, and hotels, covering 22.5% and 20.5% of the total. By extension, this shows the origin of the extraordinary increase in the capital-labor ratio in construction during the six-year crisis, growing far above the rest of the sectors (column 5), which is why by 2014, it comes to represent 176% of the national average (column 4).

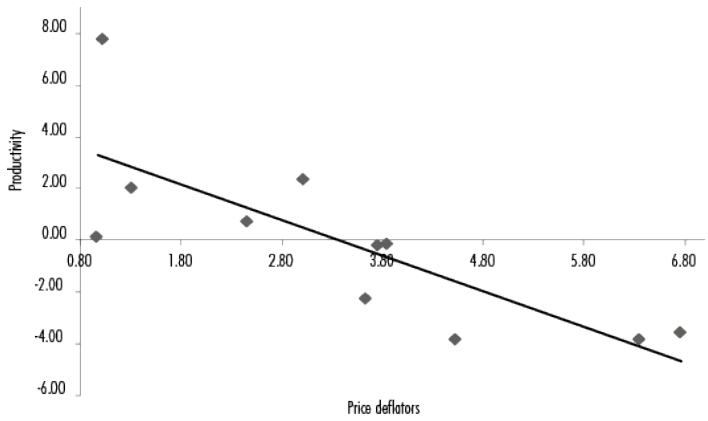
In this phase, only financial activities experienced a productivity decline (column 6), due to the profound restructuring of the banking sector, even though it was bailed out with public resources. Meanwhile, productivity in construction grew at an annual rate of 6.2%, followed by information and communication (2.99%), and other services (2.85%). Unlike in the growth period, the productivity boom in these years is explained because jobs were destroyed, so the intra-industrial effect is a fundamental aspect, with α =6.8 in the reference realm, reaching 8.7 for the entire economy. On the contrary, structural change has had a negative effect on recovering productivity, to a greater degree than the dynamic (δ =-1.36) and static (β =-0.41) pieces, data that practically do not vary even if the analysis scope is expanded to the entire economy, as shown in the first row of the final columns in Table 3. As such, in light of these results, there is no evidence for economic recovery in the Spanish economy, both due to the rationale of productivity recovery (job destruction) and the effects of the sectoral reconfiguration.

Finally, there is a reference to sectoral inflation in the expansion phase. Excluding finance, the group of sectors with the lowest relative KL ratio has been relatively more inflationary. The other services sector saw the price index rise at an annual rate of 2.4% in 1999-2007, trade, transportation and hotels grew above 3.5%, professional services reached 4.5%, and construction and real-estate activities were above 6% annual. Looking at the group of ratios with a higher K/L ratio, only industry and government had price deflators with significant growth, of 3-3.7% annual. In this sense, the most revealing aspect is the inverse relationship between sectoral inflation and the behavior of productivity during the growth period (see Figure 5). Activities with inflation above 3.5% annual have experienced absolute declines in labor productivity, which, let's remember, are associated with activities that have relatively lower capital-labor ratios.

(SEE TABLE 4)

Of the sectors with higher K/L ratios, only government experienced a slight drop in productivity, and it is precisely that price deflator that has had a rise of 3.7% annually, in any event, slightly lower than the average of the economy on the whole (3.8%). Looking at other services, this was the only activity in the second group that followed somewhat of a rising productivity path (0.75% annually), and its inflation was also the lowest in the group with the lowest K/L.

Figure 5. Price Deflators and Productivity by Activity Sector Series
in percentages for the time period 1999-2007



Notes: Annual change rates of the sectoral price deflators and those for productivity indices, including total average of the economy, finance, and real estate.
Source: INE (2015).

CONCLUSIONS

As described above, the capital accumulation process in Spain in the time period 1999-2007 was marked by a series of very particular traits. First, the accumulation rate was in fact the motor of economic growth up until 2007 in Spain, but significant distortions were present. Thus, labor-intensive growth (3.9% annual increase in 1999-2007) occurred, meaning that the capital-labor ratio barely increased 6.9% in total. Consequently, the labor requirement per unit of capital (PkW) did not fall, but rather rose by 8.6%, as a result of which the capital-wage ratio grew nearly 10% more than K/L. This process happened, moreover, in a context in which labor productivity declined -5% during the boom period.

In turn, the deflator of the capital stock rose relatively with respect to the implicit GDP price index during the boom, which points to an underlying problem in access (either by producing or importing) assets from the stock of capital. Similarly, the long depression (2008-2014) brought with it an opposite relationship between these variables: an increase in K/L (34%)

predicated on an abrupt decline in employment (-18%), which at least drove labor productivity by 12.5% and reduced PkW, containing the increase in K/W.

Second, the macroeconomic balance can only be understood by addressing the price effect of the real-estate bubble, together with sectoral distortions. There is profound divergence in terms of the price deflators when analyzing assets in the stock of capital: those related to construction versus machinery and equipment. The underlying price effect in the real-estate bubble is unearthed when considering that the assets whose prices most increased were also the most dynamic in the accumulation process (70% of total investment in 1999-2007, and still two-thirds during the recession).

Likewise, a sectoral distortion has been produced. Once again, two-thirds of total investment, including residential investment, was channeled into sectors with relatively lower K/L levels: construction; trade, transportation, and hotels; professional services; and other services. Contradictorily, to the extent that investment was price-driven, these activities (lower-tech) experienced absolute declines in labor productivity of between -16 and -25%, with the exception of the other services sector (which had the lowest level of mechanization). Accordingly, the same sectors with the lower capital-labor ratio in general have experienced sharper price increases, of above 3.5% on average per year (with the same exception of the other services sector), especially in the real estate and construction business.

The questions addressed in this paper entail diverse implications from the standpoint of the Marxist political economy. The dynamics during the expansive phase are peculiar in terms of investment and productivity, which is reflected in the nature of the recessive phase. Now, both are consistent with the fundamentals of the theoretical approach. In fact, its holistic perspective implies a consideration of the Spanish experience in light of the global accumulation dynamics in which the country is inserted, and in which space it is necessary to empirically contrast the trends espoused by Marx. As such, these particularities are explained by underlying problems related to profitability, integration with the Eurozone (with an appreciated exchange rate and plummeting interest rates), together with context-related aspects and other aspects bound up in the conditions inherent to the Spanish economy (orography, history, economic policy decisions, etc.).

The analytically relevant aspect, nevertheless, is not whether output increases or not, and with it, other variables like wages or profitability, because in no case would this information alone be sufficient to refute or verify a theoretical framework. Rather, the salient result of this research is the necessity of integrating concrete distortions into the normality of the turbulent accumulation for which it is functional. And precisely, one of its expressions is the rise of a price bubble that can only be understood by identifying capitalist production as a valorization process.

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[2] To clarify, the idea is not to explain the causes. For causes, see Mateo (2017).

[3] Although the nominal exchange rate of the Spanish peseta had not changed since 1997, in 1999, the Eurozone exchange rates were officially established.

[4] Although it is an imperfect indicator, keep in mind that the gross domestic product (GDP) per employee in Spain in 1999 was equivalent to just 75% of the Eurozone-12 average, and between 67% and 72% of the figure in Germany, France, Austria, and Finland (AMECO, 2016). According to Bank of Spain [BdE] (BdE, 2009), the K/L ratio in Spain is 18% lower than in the Eurozone-12.

[5] Even in nominal terms, the total GDP of 2016, which amounted to 1.075 trillion euros, was 3.6% lower than it was in 2008, when it amounted to 1.116 trillion (INE, 2016).

[6] From this point forward, ay reference to the average of the economy will exclude the financial and real estate sectors, unless otherwise specified with an illusion to the "total." Nevertheless, these sectors are included in some of the illustrations in order to portray the imbalances in the Spanish economy.

[7] Moreover, the wage amount used incorporates parts of the surplus, as is the case with certain income for executives, just as a fraction of the surplus recorded in the national accounting is simple mercantile production.

[8] Note that this theoretical presentation is to a certain degree abstract, as it sets aside taxes, depreciation, etc., because the purpose is to lay out the reference framework for the empirical sections.

[9] In relation to productivity and this expression, see Mas and Robledo (2010). However, it will be used in Section IV only to complement the overall analysis.

[10] In industry, the average was 80.6% until September 2007, when it fell from the 82% that month to oscillate around 70-74% between 2009-Q1 and 2013, with a recovery again the following year (BdE, 2016b).

[11] This direct relationship is typical of a speculative bubble in which the most dynamic factor is a price effect. It is to be expected, in normal conditions, such as those described in the theory section, that investment would drive productivity, pushing down costs and, in turn, relative prices.

[12] Consider that investment in transportation infrastructure in Spain is highly distorted. To a large degree, it responds to a business structure characterized as small and geographically disperse. At the same time, it has served as a mechanism, led by the State, which in large measure has sought to offer profitable investment opportunities to large companies above all other considerations. It can be affirmed that transportation has been a complement to the asset bubble.

[13] Briefly, construction and real estate go from 14% of GDP to over 18% between 2007 and 2009; trade, transportation, and hotels remained above 20%; and professional services rose from 5.6% to above 6.5% starting in 2007. Industrial activities not only exhibited a low share, but even a declining share, from 19 to 15% between 1999 and 2014 (see Mateo and Montayà, 2017).

[14] By taking the stock of fixed capital, the financial sector appears in the activities with the lowest levels of K/L, but both the particularities of the business and the way it has benefited from asset inflation ought to be considered.

[15] As mentioned earlier, the public sector has in large part supplemented the valorization of capital associated with asset inflation, and in close relationship with the transportation infrastructure. In other words, this reflects the socialization of investments with high fixed costs.

[16] Moreover, 35-38% of this investment has ended up in low-tech manufactures, and low- and medium-low-tech manufactures account for more than two-thirds of the total (68-69%) between 1999 and 2007, according to the OECD classification (2016).

[17] It should be noted that in terms of total employment this concentration is even more acute, because construction and professional services represent 22.8 and 20.1% of the total, respectively. As a result, 76.9% of total employment created happened in the three sectors mentioned. In turn, note that the percentage falls with respect to the series with a baseline of 2008 (INE, 2014), in which 77.5% of wage-earning jobs were in this sectoral realm, reaching 82.8% when expanded to all jobs.

[18] Now, another problem is that, curiously, the industries in this advanced sector in Spain had in 2013 a productivity level lower than that of

the medium-tech industry, and in turn, fewer workers per business unit (see Gandoy and Álvarez, 2015).

[19] Total industrial production rose by only 1.87% between December 1999 and 2007 (BdE, 2016a), but at the same time, it is true that Spain saw its share in European industrial production rise, although it is one of the countries, alongside Greece and Portugal, with a smaller relative weight of high-tech industries (see Álvarez et al., 2013).

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