

THE CONTRADICTIONARY PATH OF THE CAPITAL ACCUMULATION PROCESS IN SPAIN UNDER THE EURO

Juan Pablo Mateo

Kingston University, London

June, 2015

Abstract

The object of study is the dynamic of capital accumulation in Spain between 1999 and 2012, a period in which the Spanish economy has had first a system of fixed exchange rates, and then the monetary integration within the Eurozone. Investment has been largely driven by the revaluation of assets related to construction (mainly residential), which has generated a profound reshaping of the economic structure. Therefore, the relationship between investment, productivity and costs is first approached from a macroeconomic perspective, followed with an analysis of the composition by assets and sectors. Thus, it is shown that the most dynamic sectors have been those with relative low technical composition of capital, leading to absolute declines in labour productivity, as well as a price-effect that has completely distorted the reproduction of the Spanish economy.

Keywords: capital accumulation; growth; productivity; investment

JEL: E11; E22; O33; O40

Acknowledgments: I have received valuable comments from Dimitris Sotiropoulos, without any responsibility in the ideas expressed.

Address for correspondence: Department of Economics, Kingston University, Penrhyn Road, Kingston upon Thames, Surrey KT1 2EE. Email: j.mateotome@kingston.ac.uk

I. INTRODUCTION

In this article, the dynamics of capital accumulation in Spain between 1999 and 2012 are analysed. The study focuses on the central role of investment in both capital assets and labour force in order to consider the evolution of different expressions of the composition of the capital stock with respect to employment, wages and total output. In addition, it addresses labour productivity and costs, together with price deflators, with the purpose of revealing the specifics of how these variables have evolved and interacted in various major sectors of activity.¹

The choice of the post-1999 period is justified for two reasons. Firstly, the analysis of this phase allows the peculiarities of the process of accumulation under conditions of fixed exchange rates, established in 1999, followed by the complete monetary integration within an area with a higher productive development (see AMECO, 2015) to be addressed. Secondly, the ‘Ley del suelo’ (*Land law*) was approved by the government led by the Popular Party in 1998, and macroeconomic analysis shows that since the late 90s the housing bubble intensified in Spain (Bank of Spain [BoS], 2015a). The database used to account for the stock of capital, from FBBVA (2014), ends in 2012, so this article does not extend beyond this year.

The theoretical framework of this research is based on the Marxist approach. However, this paper does not conduct a quantitative re-estimation of the new value created (surplus value and variable capital) and the capital stock, which would imply a complete reshaping of the national accounts from the conceptualisation of productive and unproductive labour (see Shaikh and Tonak, 1994). The economic sphere of reference will be the entire Spanish economy, excluding the real estate business, as the objective is to analyse the process of capital accumulation of all activities, once any redistribution of value has occurred.

Capital is the basic social relation of the capitalist mode of production. In the analysis of the evolution of this category (capital accumulation), it is therefore important to study both the volume and the composition of capital stock so as to understand the level of development of productive forces, the economic growth and, thus, the income distribution and the type of external insertion. The integration of an economy like that of Spain into a large monetary area

¹ Let me clarify that this article does not intend to reveal the ultimate causes that led to this particular capital accumulation path, but to analyse how the reproduction of the economy has taken place in Spain. For an account of the underlying problem of valorisation, see Mateo (2015b).

(such as the Eurozone) is of the utmost interest from the Marxist economic approach as it reveals the implications for a country with lower level of productive development, in the sense of a reduced capacity to generate value, since the existence of a tendency toward real depreciation of exchange rate can be assumed (see Astarita, 2010).

For these reasons, this article starts with the theoretical framework of the basic facts of the accumulation of capital, that later on will be used. Then, the empirical results are considered first from a macroeconomic perspective, followed by the analysis of the structure of capital assets and major sectors of the economy.

Hereinafter, the following notes will be used to make reference to these major sectors, according to the National Institute of Statistics (INE, 2014a): AGR: agriculture and related activities; IND: industry (mining, manufacturing, water, gas, electricity); INCO: information and communication; GOV: government (administration, social services); CNT: construction; TTH: trade, transport and hotels; FIN: finances; RES: real estate; PRO: professional activities; OTH: other services.

Spain had strong growth in this period, with an average of 3.77% and 2.27% for GDP and GDP per capita respectively. This growth rate was substantially higher than both the Eurozone-12 and EU-28, as well as the core economies of the monetary union (AMECO, 2015). According to the INE (2014a), the gross fixed capital formation (GFCF) grew at an average of 5.55%, higher than not only GDP, but also household consumption (4.04%), the public sector spending (5.06%) and exports (4.99%), and only surpassed by the rise in imports (7.58%), explained by the conditions of (subordinated) external integration. Therefore, the process of accumulation has also been *quantitatively* the engine of the Spanish economy. However, investment has been driven by residential assets, with a significant rise in housing prices, which amounted to 167% in recent years.² As a consequence, the construction sector boomed, creating a speculative bubble whose collapse in 2008 generated a long crisis from which the Spanish economy still has not recovered.

There is a significant lack of research on the dynamics of capital accumulation in Spain for the period after 1999, particularly from a political economy approach, since in general these studies have a long-term perspective. Starting with those rooted in neoclassical economics, Mas, Pérez and Uriel (2006) limited themselves to the relationship between investment and

² We make reference to the price of square meter of private housing, so not subsidized by the public sector (BoS, 2015a).

capital productivity; Mas *et al* (2013) analyzed the period from 1964 to 2011, while the BoS (2009), although focusing on the period after 1995, does it in a non-exhaustive way, only as a complement of its overall outlook of the *2009 Annual Report*, and comparing it with the European area. In the case of Marxist studies, Guerrero (2006), Cámara (2007) and Nieto (2006) address the relationship between capital accumulation and profitability since 1954, but only reaching 2001 (Guerrero and Cámara) and 2003 (Nieto), while Murillo (2008) focuses on the impact on workers and the wage relation. However, these authors do not take into account sectoral aspects or the re-configuration of the capital stock.

II. THEORETICAL FRAMEWORK

The process of capital accumulation refers to the dynamics in time of capitalist production in so far as it is conceived as a surplus value-generating (SV) system. Investment (I) of a portion of profit (p) is thus explained by the purpose of capital to increase the amount of surplus labour (SL) performed along the total working time (TL). For this, capital aims at reducing production costs, which in this context means cheapening the reproduction cost of the worker, the necessary labour time (NL): $SL = TL - NL$. The monetary expression takes the form of an attempt to increase the margin on wages (W) [variable capital, V] (see later) of the new value created (NV), so $p = NV - W$. This investment increases the stock of capital (K) by the productive accumulation of a part of profits, so $I = \Delta K$.

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

This dynamics of accumulation (k) incorporates the hiring of workers (L), which makes reference to two expressions that relate both variables. First, the capital-labour (K/L) ratio is a *proxy* of the Marxian concept of the ‘technical composition of capital’ (TCC, see Marx, 1867, III), which is in fact immeasurable, and which it constitutes itself the basis of both value and organic expressions of the composition of capital.

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

Where K^* is the stock of capital at constant prices (K/P_K), and P_K the price index of K. Second, the annual flow of wages (W) received by these workers can be related in turn with

K, as a *proxy* to the so-called 'value composition of capital' (Marx, 1867, III), so 'W' would be an indicator of variable capital ($v \rightarrow W \approx v$).³

$$VCC = \frac{K}{v}$$

TCC and VCC are closely related. In principle, both tend to increase as the accumulation of capital and the productivity of labour develops, but the VCC should do it at a slower pace (Marx, 1867, III, Ch. XXIII, 2)

$$VCC = \frac{K^*}{Lw_L} \cdot \frac{P_K}{P_C} = TCC \frac{P_K}{W_L}$$

Where w_L = real wage per worker, P_C = consumer price index, so $Lw_L P_C$ is the total amount of wages at current prices. VCC is explained by both TCC and the P_K/W_L ratio (in short: PkW), defined by Wolff (2001) as follows:

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

Therefore, the growth rate of the VCC should be less than that of TCC because the mechanisation of the production process shall reduce the labour requirements per unit of capital, so $\Delta VCC < \Delta TCC$ is expected.

Third, the capital stock is related to the total product (Y), the monetary expression of the NV created by the global worker. Reference could also be made to the materialised composition of capital (Shaikh, 1987) or, as it will subsequently be stated, the (labour) productivity of capital (PK), considering capital as a social relation including labour (see Mohun, 2009). When linking 'Y' with 'K', relying on the pattern of income distribution is avoided. In addition, the amount of capital used to produce 'Y' is a basic determinant of unit costs in fixed capital, which in turn determines the consumption of fixed capital (see González and

³ There are controversies about the existence of a stock of variable capital (see Jones, 2012; Reuten, 2005) and how these categories should be quantified. For these discussions we refer to Mateo (2007), because this paper prioritises the empirical analysis with these ratios regardless of their closer degree of correspondence with what Marx could point to or not. Moreover, it is assumed that the amount of W incorporates part of income that actually corresponds to the surplus (certain executives), but also some of the operating surplus can be variable capital (some autonomous workers). Considering these elements, probably the 'variable capital' would be lower.

Mariña, 1992). (Labour) productivity of capital thus indicates the ability of the capitalist social relation to generate value, embodied in the total product.

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

PK depends on the product at constant prices (Y^*) per worker (labour productivity, π) with respect to the K/L ratio, as well as the ratio of price deflators ($P_{YK}=P_Y/P_K$). Note that labour productivity and TCC 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 labour productivity, so $TCC \rightarrow \pi$. The problem is that, gradually, the quantity of capital per worker needed to rise labour productivity becomes increased, implying a fall in the production efficiency of investment ($PEI = \pi / TCC$), that depresses the productivity of capital.

$$\frac{\partial \pi}{\partial TCC} < 0$$

If the evolution of productivity is balanced between sectors, 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, ultimately depends on the capacity of surplus value-generation achieved with the investment materialized in TCC (Shaikh, 1990). According to the labour theory of value, there is a contradiction in the need to increase the level of means of production per unit of labour required to enlarge what actually is the objective of capitalist production, the SL. On the one hand, technical change should reduce the total unitary costs (TC) of production (TC/Y) through increased productivity, including inputs of constant (c) and variable (v) capital, so $TC = c+v$. It shall be expected that the rise in productivity exceeded the wage cost, thus generating a margin on wages ($\pi - WL$), which in fact explains the tendency in the sphere of distribution for the relative pauperisation of workers, or in other words, the increasing tendency in the profit share (ps) (p/Y).

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

Yet, by increasing the K/L ratio, the fall in TC/Y implies a greater share of 'c', which means that the source of value (L) is progressively reduced in relative terms, and therefore the ability to generate SL.

However, as it will be shown later, the dynamics of accumulation in Spain during the period studied deeply distances itself from this general framework. The hallmark of the process was the inflation of assets related to construction, mostly residential, so one can speak of a ‘housing boom’, and the accumulation of capital has been supported by a strengthening of the branches of non tradables. Both features are not contradictory with the above-mentioned theoretical (and abstract) model. On the contrary, it shows how capital accumulation was carried out in an economy inserted in a currency area with a higher level of productive development, and in a context of an underlying problem of valorisation (see Mateo, 2015b). Under these conditions, the Euro validates the domestic production at a level that does not correspond to the development of productive forces, as the primary determinant of the exchange rate (connecting domestic spaces of valorisation) is the relative productivity (Astarita, 2011).⁴ This fact has led to great distortions in the structure of the assets of the stock of capital, reflected in the sectoral configuration and thus a current account deficit and high indebtedness,⁵ which have proved unsustainable as it was not founded on a corresponding capacity of producing value (and surplus). And this particular path will be the object of study in the next section.

III. MACROECONOMIC ANALYSIS

Technical change and productivity in Spain

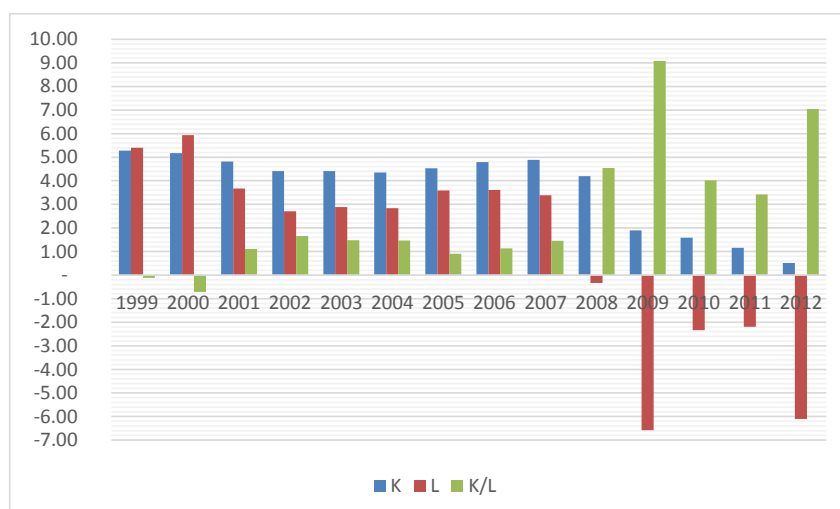
The period of growth of the Spanish economy between 1999 and 2007 was characterised by a strong rate of increase of the net capital stock, averaging 4.69%. However, this boom was not labour-saving, as wage labour grew at a rate of 3.57%. Consequently, the mechanisation of the production process had a contradictory evolution, only rising at a rate of 1.06% per year.

This dynamic was radically reversed by the economic crisis. The near stagnation of capital accumulation, which descended steadily since 2007, caused an absolute decline in employment (-3.5% annually). As a result, the K/L ratio increased by 5.6% per year, because of the higher decline in the denominator (L), despite the reduction in the rate of accumulation.

⁴ Although it is an imperfect indicator, note that the GDP per employed in Spain was, in 1999, 75% of the average of the euro area-12, and between 67 and 72% in relation to Germany, France, Austria and Finland (Ameco, 2015). The gap would be even greater if output per hour of work is taken (Mas *et al*, 2013). According to BoS (2009), Spain has 18 percentage points below the Eurozone average K/L ratio, which is also corroborated by Murillo (2010).

⁵ More than 5% of GDP from March 2004 and up to 10% through 2007-08 for the current balance, and a private debt growing from 96 to 210% of GDP between 1999 and 2009-10 (BoS, 2015a).

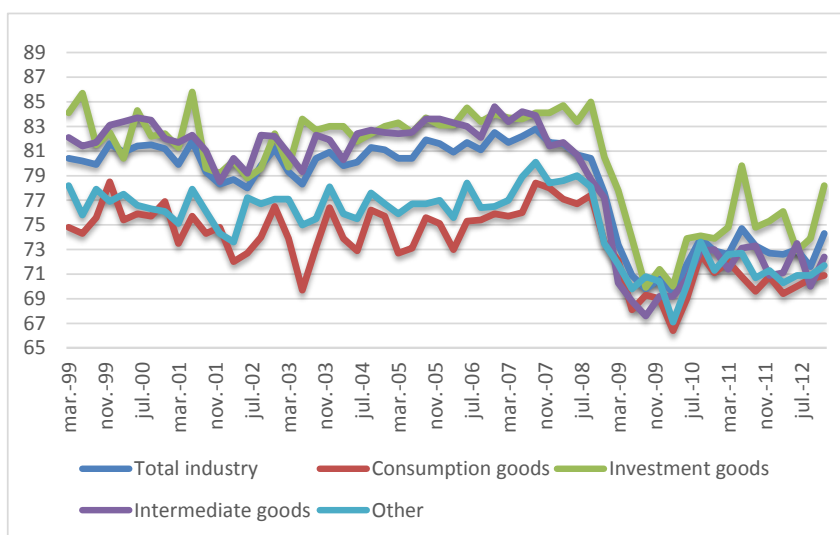
Figure 1. Annual rates of increase of K-L ratio and its determinants (1999-2012) (%)⁶



Source: INE (2014a) and FBBVA (2014)

Therefore, the behavior of TCC is anomalous, since it only increased 8.78% over the nine years of the upward phase, but it has risen 31.33% during the five years of recession. This highlights the high volatility of employment, which ultimately ‘determined’ the degree of mechanisation. However, it is to be noted that the crisis has caused a decline in the use of installed capacity. In industry, it averaged 80.64% until September 2007, when it descended from 82% to oscillate around 70-74% between the first quarter of 2009 and 2012.

Figure 2. Industry capacity utilisation (%)



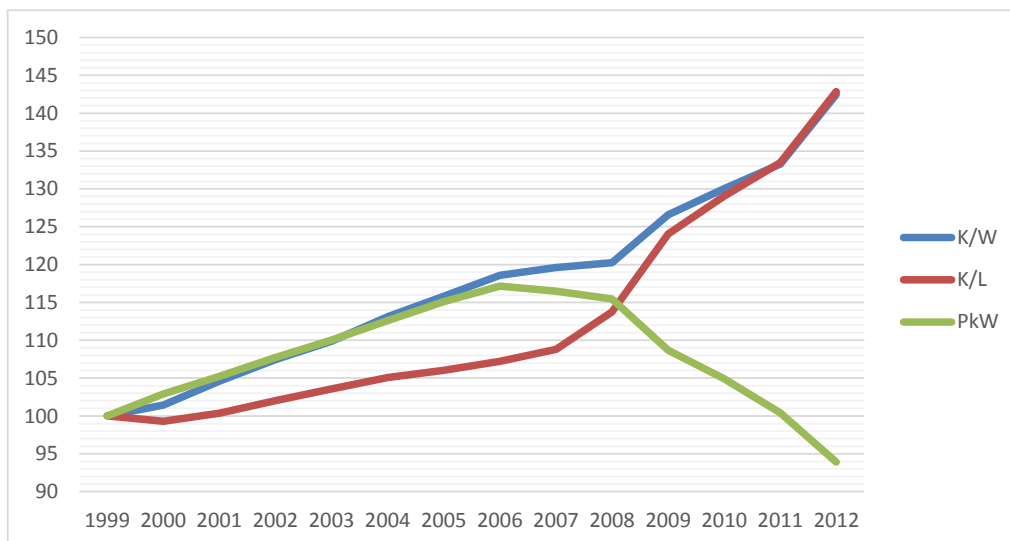
Source: BoS (2015b)

⁶ Some methodological questions: i) the measure of variables exclude the real estate activities, unless otherwise specified; K: non residential net fixed stock of capital at current prices, excluding real estate activities (FBBVA, 2014); L: Full-time equivalent labour; Y= GDP, W: wage compensation; for w_L , it is used the GDP deflator.

The distortion of the accumulation process in Spain also reveals itself in the relationship between TCC and VCC (fig. 3). Until 2007, the increase in the latter is higher by almost 10 percentage points. The reason is that the $P_{k/W}$ parameter, instead of descending as a consequence of the productive development, in fact increased 16.5%, although the maximum was reached a year earlier. This evolution reveals the labour-intensive character of the process of accumulation, which has not reduced labour requirements per unit of capital.

Since the outbreak of the crisis, however, the categories show a profile more in line with what would be expected for a growth phase: i) a drop of $P_{k/W}$ of almost 20% by 2012, enabling ii) a higher relative increase in K/L in relation to K/W . Yet, although the latter ratio has continued to increase, K/L has grown further, so the relative level in 2012 of both categories is almost equal compared to 1999, only 0.4 percentage points higher for TCC.

Figure 3. Technical and value compositions of capital
Capital-labour (TCC), capital-wages (VCC) and dP_{k/W_L} ratios (1999= 100)

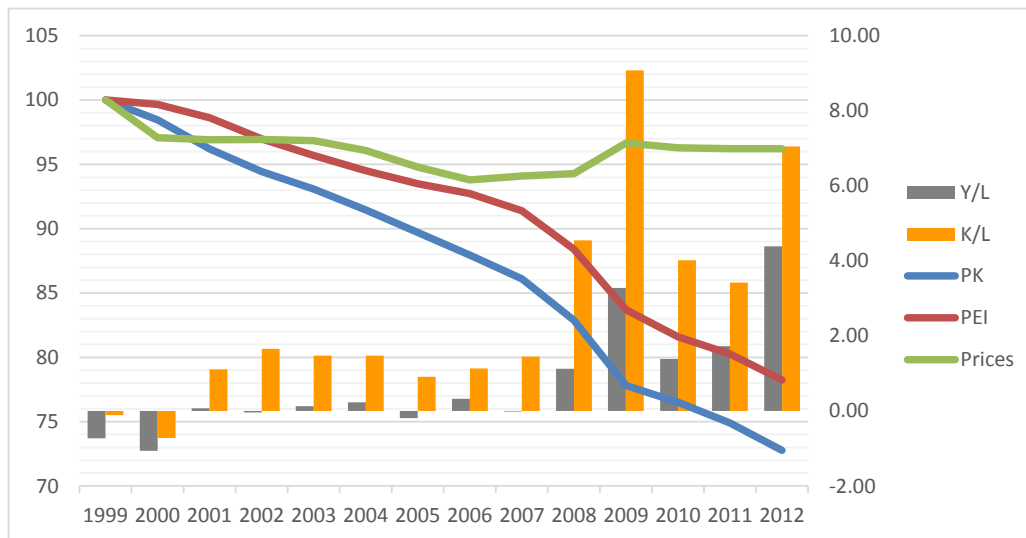


Notes. dP_{k/W_L} : $P_{k/W}$
Source: INE (2014a) and FBBVA (2014)

To the extent that TCC has depended more on the evolution of employment, the labour productivity achieved with the investment was also influenced by this fact, which in turn affects the productivity of capital (Fig. 4). The (labour) productive efficiency of investment has always fallen in this period, but there are a number of contradictory aspects to highlight: i) in the first two years the decrease is very small, but not based in a smaller difference between the increase in productivity with respect to mechanisation. Rather, it was the *absolute decrease* of Y/L , greater than that of K/L ; ii) the downward trend between 2001 and 2007 occurs in a context of stagnant productivity and a very weak mechanisation of the

production process; iii) the PEI falls between 2007 and 2009 mainly due to an increase in K/L derived from the fall of 'L', which although can achieve significant productivity gains, in relative terms the difference is higher. In short, the path of labour productivity was the inverse of what it should be theoretically expected, as it stagnated during the boom but rose with the crisis. Taking an index (1999 = 100), it was 99.43 in 2007 and 111.8 in 2012.

Figure 4. Productivity of capital and its determinants (1999= 100)



Notes. PK: productivity of capital; Y/L: labour productivity; PEI: productive efficiency of investment; Prices: product-capital ratio of prices (P_Y/P_K).
Source: INE (2014a) and FBBVA (2014)

Moreover, in this period the price deflator of the capital stock relatively increases with respect to the GDP, thus revealing either internal relative backwardness in production and/or the higher price of imported assets. It should be noted that not only did labour requirements per unit of capital increase, and so decrease the Y/K ratio, but it rose in the presence of fixed exchange rates. Therefore, this situation reveals an underlying problem of internal productive capacity and efficiency in the sphere of the means of production, related with high-technology activities.

Productive costs

The consequence of this particular process of capital accumulation is an increase in production costs (inputs and wages). Regarding the GDP, they rose from 149% to 165.8% between 1999 and 2007, and then dropped even below the initial level of the series. Unit wage costs have ranged around 50-53%, slightly down until 2006 before rebounding with the crisis. Inputs per unit of output have increased, since they represented 96.9% in 1999, but in

2006-07 reached 115% of GDP.⁷ Following the crisis, they lost 18.5 points in t2007-09 and are constant thereafter.

Figure 5. Inputs, wages and total costs with respect to GDP (%)



Source: INE (2014a)

In this sense, we must take into account that the depreciation of the stock of capital per unit of output increases substantially, from 13.45 to 17.79% of GDP in 2000-12 (INE, 2014b). This evolution occurs both in the years of growth and crisis, although it is slightly higher in the latter phase. This increase is surprising and problematic since the high share of construction assets, residential or not, as well as infrastructure, implies that the depreciation should be relatively smaller, since their useful life is high. However, if we compare the relative increase in terms of monetary value of each unit produced, the increase of depreciation turns out to be higher than the inputs.⁸ In addition, the unitary real labour cost (URLC) has also fallen. Following the AMECO (2015) database, a downward cyclical movement can be seen: a fall of 5.22% until 2006, before an increase up to 2009, when it reaches the same level as in 1999 (just 0.43% more), and a final decrease of 5.65%.

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.

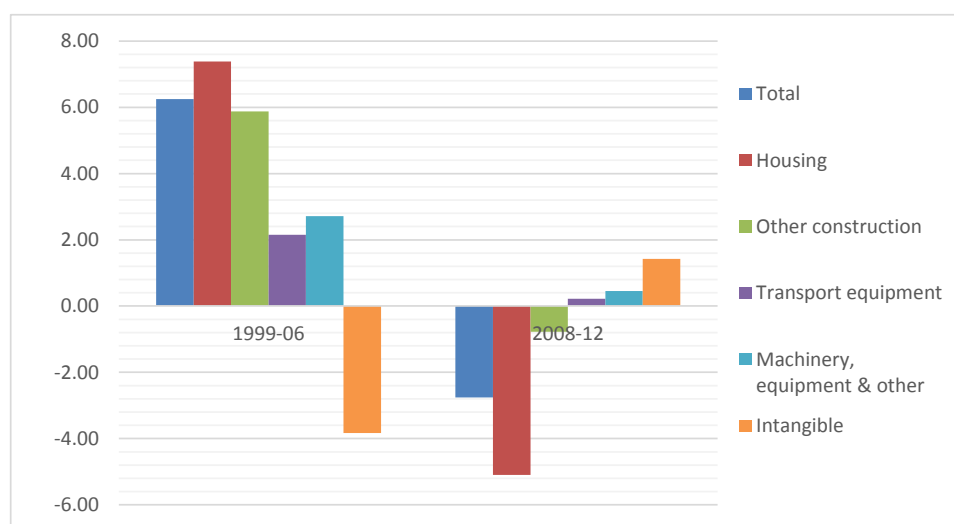
⁷ If the gross value of production is taken, the inputs also increased their relative weight, from 51.8% in 1999 to 56.3% in 2007, but going down to 50% in 2012.

⁸ The ratio IC/GDP increased by 5.5% until 2006, and then drops, so reaching a level 9% below it had in 1999, but the relative depreciation (DEP/GDP) increased by 32% until 2012.

Capital assets

Consideration of the central role of the revalorisation of residential assets requires first analysis of the structure of prices and investment flows by type of capital asset. Figure 6 shows the underlying price effect of this process of accumulation. A profound dualism between the prices of the assets related to the speculative boom (construction) and the rest is found, as prices of residential and other construction assets grew at a rate of 7.4 and 5.9%, respectively, between 1999 and 2006. The deflator of transport equipment, machinery and other equipment, meanwhile, showed a much lower rise of 2.1-2.7 % per year, while the price of intangible assets, mainly software, had an absolute annual downward trend of -3.8%.

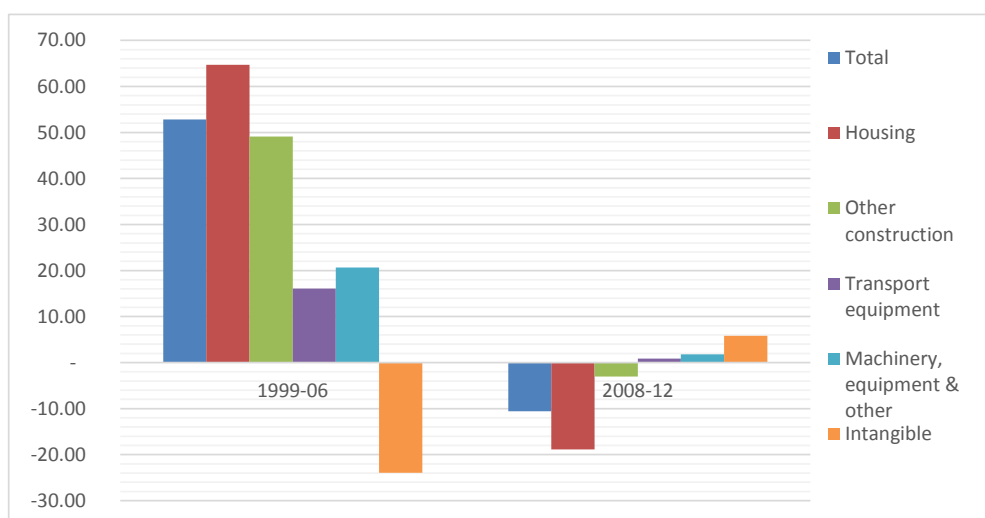
Figure 6. Price deflators of the assets of the stock of capital (inc. housing)
Annual rates of change (%) (1999-08)



Source: FBBVA (2014)

Consequently, the accumulated variations of deflators are very different (Fig. 7). Construction assets became 64.7% (residential) and 49.1% (the rest) more expensive, while the above-mentioned second group of assets only had a rise of its prices of 16-20%, in contrast to a decrease of 23.9% for the intangibles deflator. Later, between 2006 and 2008, the differences are attenuated, as the price of residential assets only increased by 1.8% annually, less than other constructions (2.6%) and that of machinery and equipment (2.8%), but more than transport equipment (0.3%).

Figure 7. Price deflators of the assets of the stock of capital (inc. housing)
Total variation (1999-08)



Source: FBBVA (2014)

However, the crisis that began in 2008 radically changed this evolution, but not the distorted heterogeneity (Fig. 6 and 7, right). The deflator of residential assets experienced an average decline of -5.1% per year until 2012, which is reflected in a loss of value of nearly 19%, and that corresponding to other construction a change of -0.7% annually. Meanwhile, in the case of assets related to machinery and equipment, prices did not significantly increase. By contrast, and surprisingly, the deflator of intangible assets did rise, up to 5.18%.

The price of residential assets, thus, exhibits a high volatility difficult to justify in terms of productive development and the amount of socially necessary labour time. In fact, there has probably been a feedback between prices and investment flows: the price has attracted investment and, in turn, investment has driven prices. This distortion of the investment can be seen by analysing their composition by asset, which shows that the assets with higher prices have been the most dynamic of the accumulation process (table 1).⁹ Those related with construction have received almost 70% of total investment during the boom, and still during the recession it has represented two-thirds, demonstrating the persistence of imbalances. By contrast, machinery, equipment and other assets received only 17.7% of the total investment, along with a downward trend, with a loss of 8 percentage points in seven years. The investment at constant prices offers minor differences, since the average annual growth rate

⁹ This direct relationship is typical of a speculative bubble in which the dynamic factor is a price-effect. It would be expected, under normal conditions, that investment increased productivity, so thus reducing costs, and therefore lowering prices.

of the first group is 5.45-6.18%, slightly higher than the second (4.32%), but less than investment in intangible assets, which turns out to be the more dynamic (8.21%).

Table 1. Investment by type of asset

Composition of total investment at current prices and annual rates of change (ARCh) (%)

	Total investment		ARCh	
	1999-07	2008-12	1999-07	2007-12
Total			5.69	-8.31
1. Housing	38.63	33.11	6.18	-12.53
2. Other constructions	31.04	33.72	5.45	-8.48
3. Transport eq.	8.62	7.35	5.66	-8.85
4. Machinery, eq. & other	17.16	18.93	4.32	-3.14
4.1 Metal products	2.55	2.79	1.93	-5.68
4.2 Mach. & mech. eq.	6.12	7.01	3.01	-5.14
4.3 Office eq. & hardware	1.92	1.78	12.50	2.16
5. Intangible	4.18	6.38	8.21	2.99

Source: FBBVA (2014)

The crisis, at least until 2012, has not yet profoundly reshaped the conditions for capital accumulation. The fall in the volume of investment in residential assets is high, at 12% per year, similar to that for the rest of construction and transport equipment, but these assets continue to receive the bulk of investment between 2007 and 2012.¹⁰

Major sectors of activity

Sectoral restructuring is the other side of the distortions of the dynamics of accumulation in Spain. In this process, the price effect has also played a central role. In terms of GDP at current prices, the most noteworthy aspect is the increase in the relative weight in GDP of the sectors related to the construction boom, together with certain services.¹¹ Sectoral imbalances in the process of capital accumulation can be seen in table 2, in which sectors are grouped based on their relative level of TCC. First, agriculture, the whole industry, information and communication and that of government, with a K/L ratio ranging between 112 and 160% of

¹⁰ Keep in mind that investment in transport infrastructure in Spain is quite distorted. On the one hand, it responds to a business structure characterized by its low size and geographical dispersion. At the same time, it has worked as a mechanism, led by the State, to provide profitable investment outlets for large corporations, even without responding to any rational economic necessity and were, therefore, unfeasible. Examples of airports in smaller cities (Castellón), high-speed train network and toll roads (Madrid) without use do prove it. Therefore, transport has been a complement to the asset bubble, which in turn is linked to the role of the economic intervention of the State (see table 2).

¹¹ Construction, which in 1999 was below 9%, reached over 12% between 2005 and 2009, and real estate also increased its share (from 5.4 to 6.9%), although it has to be considered the imputations of rents. TTH activities have maintained a share above 20%, while professional services increasing theirs from 5.4 to 7.1% between 1999 and 2012. The group of industries not only had had a low share, but also showing a downward trend, from 19% in 1999 to 15% since 2006 (see Mateo, 2015a).

total average (excluding real estate) between 1999 and 2007. Then, construction, TTH, different services and finance,¹² whose TCC amounted between one third and 80% of the total.

Table 2. Relative level of TCC and composition of total investment by sectors

TCC in % of average (total –real estate) and investment in residential and other construction assets (% of total including residential)

	K/L: relative level		Total Investment		
	1999	2007	1999	2007	2012
Total	-	-	63.39	71.29	60.03
AGR	156.90	149.03	40.43	35.33	25.95
IND	124.37	139.27	43.58	37.21	34.92
INCO	112.71	160.02	36.42	27.72	32.72
GOV	113.44	114.67	75.73	77.00	71.65
CNT	53.26	68.46	74.57	85.36	75.34
TTH	82.83	77.83	50.13	46.96	35.72
FIN	75.00	62.75	-23.20	-35.99	52.73
RES	-	-	99.50	98.78	98.86
PRO	57.00	44.74	39.38	29.86	34.93
OTH	33.71	59.48	64.38	71.59	62.87

Source: INE (2015a) and FBBVA (2014)

The share of investment in housing and other constructions has no direct relationship with the level of mechanisation, but there are elements to underline. AGR, IND and INCO show a level substantially below average (27-44% of the total), while government activities, despite its high TCC, are intensive in this type of investment, which reveals their participation in the construction boom.¹³

Sectoral distortions in the accumulation process are shown in table 3. The first aspect worth mentioning is the low level of investment channeled to the industrial activities, which did not even get 14% of the total, considering the size of this sector.¹⁴ Meanwhile, 41% of the total flow of investment was directed to CNT and RES. So, about two thirds of total investment, including that of residential type, was destined to sectors with lower levels of mechanisation. These investment flows have caused a rate of increase in the stock of capital heavily

¹² In taking the stock of fixed capital, the financial sector appears in activities with lower levels of TCC, but it should be kept in mind the particularities of its activity, in fact strengthened by the housing boom.

¹³ As stated before, the public sector has largely complemented the asset-inflation-related valorisation of capital, and in close connection with the transport infrastructure. The State can carry out investments in expensive capital-intensive projects, while enabling private companies to reap the benefits using their infrastructure, even in activities with lower costs.

¹⁴ In addition, 35-38% of this investment has been allocated at the low technology manufactures, and total low and medium-low technology manufactures accounted for more than two-thirds (68-69%) between 1999 and 2007, according to the classification of OECD (2015).

differentiated in these sectoral terms. Thus, the most dynamic activities in this regard have been generally those with relatively lower levels of TCC with the exception of information and communication.

Table 3. Sectoral distortions in the accumulation process (1999-07) (%)

Composition of total variation (Δ) and annual rates of change (ARCh)

	I	K	L	K/L	Y/L	K/L	Y/L
	%Δ total	ARCh	%Δ total	ARCh		Total	
Total	100.00	4.77	100.00	1.12	0.00	9.34	0.01
AGR	1.91	1.35	0.76	0.41	-0.13	3.33	-1.00
IND	13.94	2.39	-1.55	2.50	1.81	21.82	15.46
INCO	4.18	9.32	2.29	5.58	1.96	54.45	16.77
GOV	12.95	4.06	18.36	1.19	0.76	9.97	6.26
CNT	10.41	10.68	25.01	4.28	-1.65	39.83	-12.47
TTH	16.05	4.95	32.21	0.28	-1.45	2.23	-11.01
FIN	1.64	0.44	0.94	-1.17	8.42	-8.99	90.88
RES	30.68	7.24	1.67	-1.11	-5.80	-8.58	-37.98
PRO	4.86	7.44	20.31	-1.95	-3.60	-14.61	-25.41
OTH	3.38	12.64	7.81	8.49	0.00	91.91	-0.03
Exc. RES	-	4.69	-	1.06	-0.07	8.78	-0.57

Notes. I: investment, K: capital; L: labour; Y: product;

Source: INE (2015a) and FBBVA (2014)

The hiring of workers in Spain has been even more concentrated than investments, as 1/3 of salaried jobs were created in TTH, 1/4 in CNT and 1/5 in PRO, representing 77.5% of the salaried employment generated. These three groups of activities have levels below average in mechanisation, and of those, only construction increased its TCC, at a rate of 4.28% per year, which resulted in almost 40% of total increase. The other sectors that did show a significant increase in TCC were OTH and INCO, with average annual rates of 8.5 and 5.6% respectively.

There are two elements to emphasise in relation to the process of accumulation and productive mechanisation. Firstly, the most dynamic sectors in terms of 'k' are labour intensive, that is, with relatively low levels of TCC, which is usually associated with lower technological content. Secondly, biased investment towards activities with lower technological development has not even served to balance the sectoral structure of the TCC, so that disparities widened over 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, only 33.7% of the average of TCC in 1999, and less than 60% in 2007.

In the second part of table 3 the relationship between TCC and labour productivity can be analysed. As shown in in section III, the aggregate behavior of the productive efficiency of investment was certainly deficient, and now it is shown that it actually hides deep sectoral asymmetries.

i) Only finance achieves an annually increase in labour productivity above 2%. However, the outstanding performance (8.4% per year) reveals the housing boom financed by banks, to both households and non-financial corporations, with a rather fictitious character.

ii) The sectors that could increase labour productivity, although at levels below 2% per year, were IND, INCO and GOV. However, several clarifications are imposed:

- a) The increase in productivity achieved was substantially lower than the corresponding increase in TCC: only 35% in the case of INCO, and less than 63% and 72% for GOV and IND respectively;
- b) The absolute level of productivity of GOV is relatively low, 65-70% on average (excluding real estate); and
- c) The Spanish industry has suffered this restructuring in the benefit of non-tradable activities, so it has specialised in activities of medium-low technological content (see De Juan and Lopez 2004; García and Tello 2011). It has a reduced relative level of K/L compared to other countries in the European Union (BoS, 2009), which is reflected in their relative productivity. Thus, in 1999 it only reached 84% of the national average, while in 2007 at least was close to it (98%).¹⁵ The value added shares relative to manufacturing of low and medium-low technology manufacturers account for around two-thirds of the total value added in manufacturing, but only 6-7% for high technology (OECD, 2015). In relation to the total economy, high and medium-high technology manufacturers show a very low level, and substantially with a downward trend, from 6.4% to 4.2% in 1999-09. However, imports of these products represent 56-49% of the total (OECD, 2015).

¹⁵ Total industrial production increased by just 1.87% between December 1999 and 2007 (BoS, 2015a), but it nevertheless remains true that Spain increased its participation in the European industrial production, and is one of the countries, together with Greece and Portugal, with the lowest weight of higher technological level industries (see Álvarez *et al.*, 2013).

iii) With the exception of finance, below-average TCC sectors had fallen in absolute levels of productivity or, in the case of OTH, stagnation, although some of them will increase the K/L ratio.

Consequently, the economic sectors of the bottom of the figure, with lower technological level in terms of the TCC, received two thirds of the investment (67%), including residential, and generated 87% of total employment, but paradoxically experienced declines in productivity (-10 to -25% in 1999-07). There are two exceptions: i) other services, with the absolute lowest level of TCC; and ii) finance, which in turn relates to the distortions associated with the housing boom.

Moreover, the crisis that began in 2007-08 has fostered some sectoral reconfiguration of capital accumulation, but outstanding distortions remain: the four sectors with an annual growth rate of capital stock (non-residential) above 3% are CNT, RES, OTH, as well as GOV. The fall in the rate of accumulation has generated a significant reduction in salaried employment, which in 2012 fell by 16.4% compared to 2007. The job losses are explained by three sectors, as more than a half occurred in construction, and nearly a fifth in TTH, which in fact contributed to the fall in unemployment during the expansion. It should be noted as well that industry was responsible for 23.4% of the decline in employment.

Table 4. Capital, labour and productivity by sectors (2007-12)

Composition of total variation (Δ) and annual rates of change (ARCh)

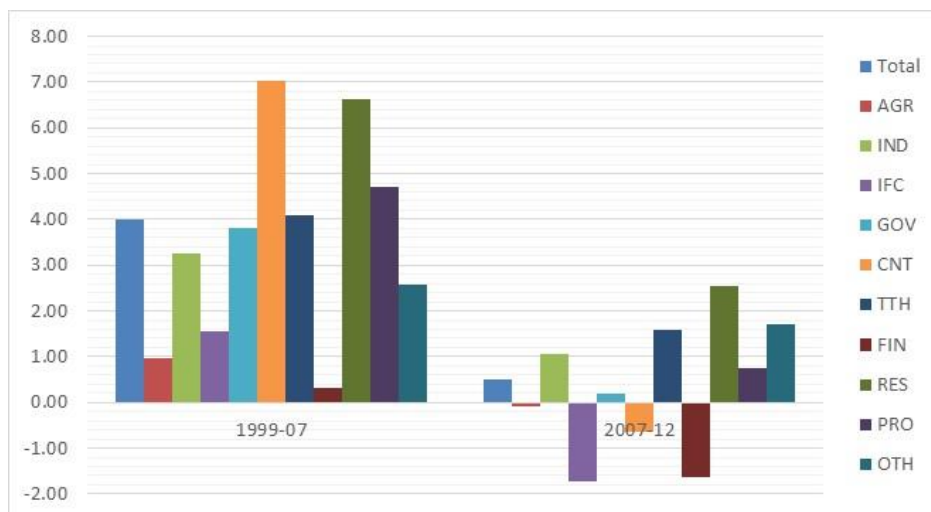
	K	L	L	K/L relative	K/L	Y/L
	ARCh		%Δ total	2012	ARCh	
Total	2.43	-3.52	100.00		5.72	2.65
AGR	0.53	-1.16	0.96	122.43	1.53	-0.88
IND	1.42	-4.93	23.40	145.53	6.53	4.09
INCO	2.38	-0.05	0.04	136.79	2.34	2.01
GOV	3.44	0.42	-2.90	98.50	2.44	1.64
CNT	3.21	-16.98	56.43	145.01	22.71	10.04
TTH	1.79	-2.47	19.30	72.42	4.09	2.80
FIN	-2.36	-1.86	1.30	46.29	- 0.63	-0.29
RES	6.06	-1.18	0.29	475.58	6.53	2.21
PRO	-1.60	-0.39	1.19	31.28	- 1.69	0.93
OTH	7.01	-1.19	2.57	65.60	7.69	1.42
Exc. RES	2.29	-3.54	-	100.00	5.60	2.37

Notes. K: stock of capital; L: labour; Y: product; ARCh: annual rates of change
Source: INE (2015a) and FBBVA (2014)

Only finance and agricultural sectors saw declines in productivity. Meanwhile, the labour productivity of construction rose 10% annually, followed by industry (4%) and TTH (2.8%). That is, precisely the sectors in which there have been absolute job losses. Consequently, the crisis did not lead, at least for these five years, to any modification of the sectoral model of accumulation. Furthermore, increases in both labour productivity and TCC are not indicative of any recovery or sectoral reconfiguration that will avoid such distortions in the future, so they are mere conjunctural upturns product of job losses.

Behind these features of capital accumulation, there is the critical importance of sectoral rates of inflation. Excluding finance, the sectors with less TCC have generally had increases over 4% in average annual price deflators, particularly RES and CNT. In the other group, the activities of the GOV and the IND have also had some inflationary component, above 3%. However, the heterogeneity in the evolution of the different price deflators has amplified, with deflationary dynamics in both groups of activities.

Figure 8. Price deflators by sector of activity
Annual rates of change (%)

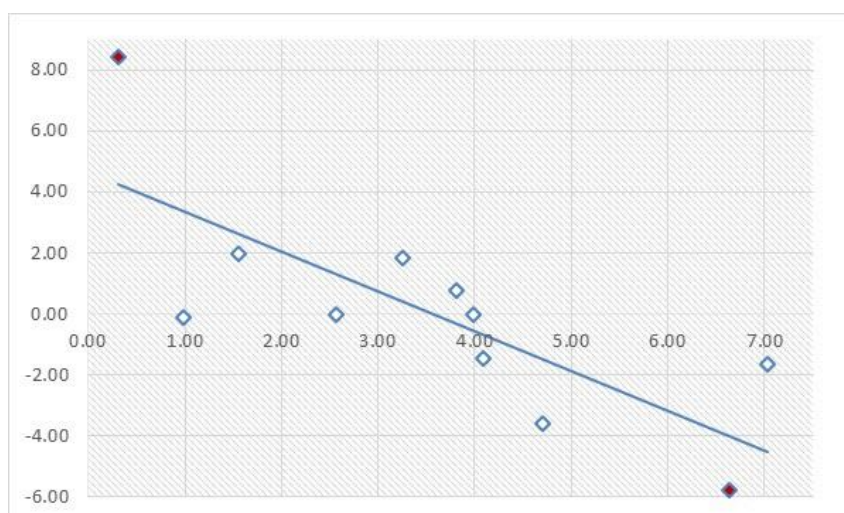


Source: INE (2014a)

The most illustrative aspect reveals itself in the kind of inverse relationship between sectoral inflation and productivity performance during the growth phase. Activities with inflation above the average (4%) had absolute declines in labour productivity. The agricultural sector could be added to this group, whose deflator increased at 0.98% per year. Thus, sectors with the highest relative level of TCC, which had increases of Y/L, although small, have had below average inflation, and in the case of INCO, even below 2%.

Figure 9. Productivity Vs prices

Annual rates of change of labour productivity (right) and prices (left)



Notes: in red, finances and real estate activities

Source: INE (2014a)

CONCLUSIONS AND ECONOMICS IMPLICATIONS

Imbalances in the process of capital accumulation in Spain have been associated with the relationship between the housing boom, especially real estate, and the tradable Vs non tradable character of the activities. This particular dynamic led to a model of reproduction during the 1999-07 period following just the opposite trend as would be expected from the above-mentioned theoretical framework in terms of technical change, costs and productivity.

First, the accumulation of capital was in fact the engine of the economic growth in Spain, averaging 4.69% in the 8-year phase, but a number of distortions have been found. Thus, it was a labour-intensive growth (rising 3.57% per year), so our *proxy* for TCC barely rose by 8.78%. As a consequence, the labour requirements per unit of capital (PkW parameter) did not drop, but it did increase (16.5%), so VCC rose 10 percentage point more than TCC; and so happened with a stagnated labour productivity. The result was a 16 percentage point increase in total costs per unit of product, explained by inputs and not because of wages.

One of the related facts is the increase of the capital deflator in relation to that of GDP, showing an underlying problem in the access (either producing or importing) to these assets. Conversely, the long recession (2008-12) brought the opposite relationship among these variables: rising TCC (31%) based on the abrupt drop of employment, which at least fostered labour productivity more than 10% and reduced PKW, so the increase of VCC was slowed down.

Second, this macroeconomic balance can only be grasped by addressing the price-effect of the housing boom together with the sectoral disequilibria.

- i) There is a deep divergence in terms of price deflators when analyzing the assets of the stock of capital: those related with construction (<50% in 1999-07) versus machinery and equipment (16-20%), and even an absolute cheapening in intangible ones. The underlying price-effect of the housing boom is revealed because the assets with higher increase in prices have been the most dynamic of the accumulation process (70% of total investment in 1999-07 and still two-thirds during the recession);
- ii) And also, there is a sectoral distortion. Again, two thirds of total investment, including that of residential type, was channeled to sectors with lower relative levels of TCC (labour-intensive): other services, construction (real estate) and professional services, with the exception of information and communications (capital-intensive). Contradictory, as investment was price-led, these dynamic (and below-average TCC) sectors of activity had absolute declines in labour productivity between -10 and -25%, with the exceptions of other services (having the lowest level of mechanisation), and finances. In this sense, the same sectors with lower TCC have generally had relative higher levels of prices increases, over 4% average per year, particularly real estate and construction, and with declines in labour productivity. Unfortunately, the 5 years following the outbreak of the crisis have not changed these facts.

These distortions in terms of prices, productivity and costs have a number of implications in various spheres of the economy, as it is the case of distribution and the external insertion. On the one hand, there is no objective basis on which wages could rise without threatening the continuity of the housing boom, whose reproduction is based precisely on a wage regression that also reveals its inner limits: the house price cannot increase indefinitely regardless of the fundamentals of the law of value. Real wages per worker fell by 3.44% during the boom, while increased by 11.7% with the crisis.¹⁶

¹⁶ Although data depend on the statistical sources and the price deflator used (see Ameco 2015 and OECD 2015), which could lead to the conclusion of real wages falling in 1999-07 with GDP deflator or slightly increasing. However, the housing boom poses some difficulties when measuring the purchasing power of wages, and somehow it becomes a means for the real wage reduction. The increase in the housing price, a durable consumer good, is not correctly reflected in the CPI. While the average price of square meter of private housing

On the other, the rising cost of inputs and the decline in productivity in the growth phase led to a problem of competitiveness, even in the low-medium sectors in which it is specialized. Thus, Spanish competitiveness indices from the BoS (2015) show relative increases in costs between 1999 and 2007: 16% in relation to EMU-18, 13-14% with the EU-28, and 12-13% when taking the unit relative labour costs. In addition, the price effect of the housing boom and the relative dynamism of the activities of non-tradable goods are reflected in a relatively high inflation compared with the Eurozone. Note that in a context characterised by the existence of a single currency, it implies an appreciation of the Spanish real exchange rate, aggravated by the appreciation of the Euro, more than 75% between February 2002 and March-July 2008 (BoS, 2015a). Therefore, the accumulation of capital has brought an increase in imports, with the corresponding deficit of the trade and the current account balances, up to 10% of GDP.

REFERENCES

Álvarez, Ignacio; Fernando Luengo and Jorge Uxó (2013). *Fracturas y crisis en Europa*. Clave Intelectual, Madrid.

AMECO (2014). *Annual macro-economic database*. European Commission, Economic and Financial Affairs.

Astarita, Rolando (2010): *Economía política de la dependencia y el subdesarrollo*. Universidad Nacional de Quilmes, Buenos Aires.

_____ (2011). “Reflexiones sobre la crisis del euro”, Unpublished paper, December 17. Available at <<http://rolandoastarita.wordpress.com/2011/12/17/reflexiones-sobre-la-crisis-del-euro-1/>>

BACH (2015). *Bank for the accounts of companies harmonized*, Banque de France, European Commission.

BoS (2009). *Annual report*. Bank of Spain, Madrid.

_____ (2015a). *Statistical bulletin*. Bank of Spain, Madrid.

_____ (2015b). *Economic indicators*. Bank of Spain, Madrid.

Cámara, Sergio (2007). “The dynamics of the profit rate in Spain (1954-2001)”, *Review of Radical Political Economics*, 39(4): 363-381

De Juan, Oscar and Luis Antonio López (2004). “Cambio técnico y cambio ocupacional en la economía española (1980-2000)”, *Cuadernos de Economía*, 27(74): 3-31.

BBVA (2014): *El stock y los servicios del capital en España y su distribución territorial y sectorial (1964-2012)*. Fundación BBVA/Ivie, Madrid.

has increased by 167% between 1999 and 2007, and 98% since 2002, the housing component of the CPI only rose by 27% since January 2002 (first year the BoS (2015a) provides disaggregated information).

García, Coral and Patrocinio Tello (2011). “La evolución de la cuota de exportación de los productos españoles en la última década: el papel de la especialización comercial y de la competitividad”, *Economic Bulletin*, May, pp. 50-60, Bank of Spain, Madrid.

González, Jaime y Abelardo Mariña (1992). “Formación de capital, productividad y costos: relaciones básicas”, *Análisis Económico*, X(20): 3-17.

INE (2014a). *Spanish national accounts. Base 2008. Homogeneous series 1995-2012*. Instituto Nacional de Estadística, Madrid.

____ (2014b). *Spanish national accounts. Base 2008. Accounting series 2000-2012*. Instituto Nacional de Estadística, Madrid.

Jones, Peter (2012). “Depreciation, devaluation and the rate of profit”, Association for Heterodox Economics, Conference Papers. Available at http://hetecon.net/division.php?page=ahe_conferences&side=conference_papers&sub=2012_conference

Kliman, Andrew (2011). *The failure of capitalist production*. Pluto, London.

Marx, Karl (1867). *Capital*, Vol. I. Available in <http://www.marxists.org/>

Mas, Matilde; Pérez, F.; Uriel, E. (2006): “Composición de la inversión y productividad del capital”, Cuadernos Capital y Crecimiento, No. 2. FBBVA, Madrid.

Mas, Matilde; Francisco Pérez and Ezequiel Uriel (2013). *Inversión y stock de capital en España (1964-2011): evolución y perspectivas del patrón de acumulación*. Fundación BBVA, Informes 2013 Economía y Sociedad, April.

Mateo, Juan Pablo (2007). *La tasa de ganancia en México, 1970-2003*. Ph. D., Complutense University of Madrid.

____ (2015a). “Acumulación de capital y desequilibrios de la economía española. Un análisis macroeconómico del período 1995-2007”, *Revista Galega de Economía* (forthcoming)

____ (2015b). “Profitability in the Spanish economy (1995-2012)”, Unpublished paper.

Maudos, Joaquín and Juan Fernández de Guevara (2014): *Endeudamiento de las empresas españolas en el contexto europeo: el impacto de la crisis*. FBBVA, Bilbao.

Mohun, Simon (2009). “Aggregate capital productivity in the US economy, 1964–2001”, *Cambridge Journal of Economics*, 33(5): 1023–1046.

Nieto, Maximiliano (2006). “Tendencias de la rentabilidad y la acumulación en el capitalismo español (1954-2003)”, *Revista de Economía Institucional*, 8(15): 185-206.

OECD (2015). *Statistical indicators*. Organisation for Economic Co-operation and Development, Paris.

Reuten, Geert (2005). “On the quantitative homology between circulating capital and capital value: the problem of Marx's and the Marxian notion of 'variable capital'” (draft, June), paper presented at the II Conference *Marx: sobre el concepto de capital*: México city, 11-14 July.

Shaikh, Anwar (1987). “Organic composition of capital”, in John Eatwell, Murray Milgate and Peter Newman (eds.), *The new palgrave. Marxian economics*. Macmillan, Londres and New York, 1990, pp. 304-309.

Shaikh, Anwar (1990): *Valor, acumulación y crisis*. Tercer Mundo Editores, Bogota, 1991.

Shaikh, Anwar and Ahmet Tonak (1994): *Measuring the wealth of nations: the political economy of National Accounts*. Cambridge University Press, Cambridge.

Wolff, Edward N. (2001). "The recent rise of profits in the United States", *Review of Radical Political Economics*, 33(3): 315-324.